EXPERIMENT STATION RECORD

WASHINGTON
GOVERNMENT PRINTING OFFICE
1908

U. S. DEPARTMENT OF AGRICULTURE

Secretary of Agriculture

WEATHER BUREAU—[illegible], *Chief.*
BUREAU OF ANIMAL INDUSTRY—[illegible], *Chief.*
BUREAU OF PLANT INDUSTRY—W. A. Taylor, *Chief.*
FOREST SERVICE—H. S. Graves, *Forester.*
BUREAU OF SOILS—Milton Whitney, *Chief.*
BUREAU OF CHEMISTRY—[illegible], *Chief.*
BUREAU OF CROP ESTIMATES—[illegible], *Statistician.*
BUREAU OF ENTOMOLOGY—L. O. Howard, *Entomologist.*
BUREAU OF BIOLOGICAL SURVEY—[illegible], *Chief.*
OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING—[illegible], *Director.*
BUREAU OF MARKETS—C. J. Brand, *Chief.*

STATES RELATIONS SERVICE—A. C. True, *Director.*
OFFICE OF EXPERIMENT STATIONS—E. W. Allen, *Chief.*

THE AGRICULTURAL EXPERIMENT STATIONS

ALABAMA—
College Station: [illegible], Director.
Canebrake Station: *Chief Officer:* J. M. Pearson.
Tuskegee Station: *Principal Assistant:* G. W. Carver.
ALASKA—[illegible], C. C. Georgeson.
ARIZONA—*Tucson:* R. H. van Kleeck, *Director.*
ARKANSAS—*Fayetteville:* M. Kelsey.
CALIFORNIA—*Berkeley:* T. F. Hunt.
COLORADO—*Fort Collins:* C. P. Gillette.
CONNECTICUT—
State Station: *Vice Director:* W. H. Jordan.
State Station: *Storrs:* [illegible]
DELAWARE—*Newark:* H. Hayward.
FLORIDA—*Gainesville:* P. H. Rolfs.
GEORGIA—*Experiment:* J. D. Tidwell.
GUAM—*Island of Guam:* C. W. Edwards.
HAWAII—
Federal Station: *Honolulu:* [illegible].
Sugar Planters' Station: *Honolulu:* H. P. Agee.
IDAHO—*Moscow:* E. J. Iddings.
ILLINOIS—*Urbana:* E. Davenport.
INDIANA—*La Fayette:* C. G. Woodbury.
IOWA—*Ames:* C. F. Curtiss.
KANSAS—*Manhattan:* F. D. Farrell.
KENTUCKY—*Lexington:* T. P. Cooper.
LOUISIANA—
Head Station: *Baton Rouge:* W. R. Dodson.
Rural Station: *Audubon Park, New Orleans:* W. R. Dodson.
North La. Station: *Calhoun:* W. R. Dodson.
Tobacco Station: *Quitman:* W. R. Dodson.
MAINE—*Orono:* C. D. Woods.
MARYLAND—[illegible]
MASSACHUSETTS—[illegible]
MICHIGAN—[illegible]
MINNESOTA—[illegible]
MISSISSIPPI—
College Station: *Agronomist:* [illegible]
Fruit Station: *Horticulturist:* F. W. Pas
Mississippi—[illegible]
MISSOURI—*Columbia:* [illegible]
MONTANA—*Bozeman:* [illegible]
NEBRASKA—*Lincoln:* [illegible]
NEVADA—*Reno:* [illegible]
NEW HAMPSHIRE—*Durham:* [illegible]
NEW JERSEY—*New Brunswick:* J. G. Lipman.
NEW MEXICO—*Agricultural College:* [illegible]
NEW YORK—
State Station: *Geneva:* W. H. Jordan.
Cornell Station: *Ithaca:* A. R. Mann.
NORTH CAROLINA—*Raleigh and West Raleigh:* [illegible]
NORTH DAKOTA—*Agricultural College:* [illegible]
OHIO—*Wooster:* C. E. Thorne.
OKLAHOMA—*Stillwater:* [illegible]
OREGON—*Corvallis:* A. B. Cordley.
PENNSYLVANIA—
State College: [illegible]
State College: *Institute of Animal Nutrition:* H. P. Armsby.
PORTO RICO—
[illegible]
Federal Station: *Mayaguez:* [illegible]
Insular Station: *Rio Piedras:* [illegible]
RHODE ISLAND—*Kingston:* [illegible]
SOUTH CAROLINA—*Clemson College:* [illegible]
SOUTH DAKOTA—*Brookings:* [illegible]
TENNESSEE—[illegible]
TEXAS—
[illegible]
Substation No. 4, *Beaumont:* [illegible]
Substation No. 5, *Troupe:* [illegible]
Substation No. 6, *Temple:* [illegible]
UTAH—*Logan:* [illegible]
VERMONT—*Burlington:* [illegible]
VIRGINIA—
[illegible]
Truck Station, *Norfolk:* [illegible]
WASHINGTON—*Pullman:* [illegible]
WEST VIRGINIA—*Morgantown:* [illegible]
WISCONSIN—*Madison:* [illegible]
WYOMING—*Laramie:* [illegible]

EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, PH. D., *Chief, Office of Experiment Stations.*
Associate Editor: H. L. KNIGHT.

EDITORIAL DEPARTMENTS.

Agricultural Chemistry and Agrotechny—SYBIL L. SMITH.
Meteorology, Soils, and Fertilizers {W. H. BEAL. J. D. LUCKETT.
Agricultural Botany, Bacteriology, and Plant Pathology {W. H. EVANS, Ph. D. W. E. BOYD.
Field Crops {J. I. SCHULTE. J. D. LUCKETT.
Horticulture and Forestry—E. J. GLASSON.
Economic Zoology and Entomology—W. A. HOOKER, D. V. M.
Foods and Human Nutrition {C. F. LANGWORTHY, Ph. D., D. Sc. LOUISE B. PRITCHETT.
Zootechny, Dairying, and Dairy Farming {D. W. MAY. M. D. MOORE.
Veterinary Medicine {W. A. HOOKER. SYBIL L. SMITH.
Rural Engineering—R. W. TRULLINGER.[1]
Rural Economics—E. MERRITT.
Agricultural Education {A. DILLE. MARIE T. SPETHMANN.
Indexes—M. D. MOORE.

CONTENTS OF VOL. 39, No. 3.

SUBJECT LIST OF ABSTRACTS.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

[1] On leave of absence for military service.

METEOROLOGY.

SOILS—FERTILIZERS.

AGRICULTURAL BOTANY.

FIELD CROPS.

HORTICULTURE.

FORESTRY.

DISEASES OF PLANTS.

ENTOMOLOGY.

FOODS—HUMAN NUTRITION.

ANIMAL PRODUCTION.

DAIRY FARMING—DAIRYING.

VETERINARY MEDICINE.

RURAL ENGINEERING.

RURAL ECONOMICS.

AGRICULTURAL EDUCATION.

MISCELLANEOUS.

LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

Stations in the United States.

Stations in the United States Con.

U. S. Department of Agriculture.

[1] Printed in scientific and technical publications outside the Department.

EXPERIMENT STATION RECORD.

VOL. 39. ABSTRACT NUMBER. No. 3.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Determination of various forms of nitrogen in bovine flesh, including the products of hydrolysis of some of the proteins, I, II, W. E. THRUN and P. F. TRowBRIDGE (*Jour. Biol. Chem., 34 (1918), No. 2, pp. 343–353, 355–362*).—Two papers are reported.

I. *The hexone bases of some flesh proteins.*—The proteins used were (1) the cold water-soluble fraction, a mixture of stroma and plasma proteins consisting albuminoids and nucleoproteins, and (2) the cold water-soluble heat-coagulable fraction, a mixture of plasma protein with the albumins and globulins of flesh. It was found that the cold water-insoluble proteins yield on hydrolysis less humin, ammonia, and histidin and more arginin nitrogen than do the coagulated beef proteins. A comparison of the composition of the cold water-insoluble samples from the flesh of a newborn calf and of a 5-year-old steer shows that the latter contains less ammonia and histidin and more arginin, indicating that during growth the insoluble proteins change in composition.

II. *The bromination of the hydrolysates of some beef flesh proteins.*—The arginin nitrogen in some of the samples used in the investigation noted above was determined by the bromination method of Plimmer and Eaves (E. S. R., 32, p. 807). No significant differences in results between this method and the method of isolation and weighing were found. A determination of the bromin consumption of cystin was made and the amount of bromin absorbed when the cystin was treated with an excess of nascent bromin for 15 minutes was found to be about 10 atoms per molecule.

The bromination method was also applied to the determination of histidin. Results on three different proteins by this method agreed well with the results obtained by the Van Slyke method. The method consisted of brominating the solution of the bases of the coagulable protein sample, and deducting from the weight of the bromin absorbed the weight absorbed by the cystin as calculated from the cystin nitrogen found by determining sulphur in another sample and from the bromination value of cystin of 10 atoms per molecule. To the percentage thus obtained is added 1.17 per cent as a correction for the solubility of histidin in the presence of phosphotungstic acid. Attention is called to the fact that the method requires only two determinations as against three by the Van Slyke method.

The filtrate from the bases was brominated and from these data approximate values for the trytophane content were calculated.

The globulin of buckwheat, Fagopyrum fagopyrum, C. O. JOHNS and L. H. CHERNOFF (*Jour. Biol. Chem., 34 (1918), No. 2, pp. 439–445*).—The

globulin of buckwheat flour was obtained by extracting the flour with from 5 to 10 per cent sodium chlorid solution, precipitating the protein with ammonium sulphate, redissolving in water, and dialyzing the solution until the salts were removed. The yield was about 20 per cent of the nitrogen present. The percentage of basic amino acids in the globulin was arginin 12.97, histidin 0.59, lysin 7.9, and cystin 1.

The high percentage of basic amino acids is considered of importance in view of the fact that buckwheat flour is frequently used with wheat flour. Although a mixture of these two flours would have a lower protein content than wheat flour alone, the proteins of the mixed flour would probably be more efficient owing to the higher percentage of basic amino acids.

Stizolobin, the globulin of the Chinese velvet bean, Stizolobium niveum, C. O. JOHNS and A. J. FINKS (*Jour. Biol. Chem., 34 (1918), No. 2, pp. [illegible]-438*).—The principal protein extracted from the Chinese velvet bean by means of a sodium chlorid solution is a globulin named by the authors stizolobin. The percentage of the basic amino acids in stizolobin determined by the Van Slyke method was cystin 1.2, arginin 6.72, histidin 2.65, and lysin 8.27. Tryptophane was also found to be present.

Lecithin and allied substances: The lipins, H. MACLEAN (*London and New York: Longmans, Green & Co., 1918, pp. VII+206; rev. in Jour. Amer. Chem. Assoc., 70 (1918), No. 22, p. 1631*).—This volume of the series of monographs on biochemistry deals with the subject of lipins.

The author defines lipins as "substances of a fat-like nature yielding on hydrolysis fatty acids or derivatives of fatty acids and containing in the molecule nitrogen or nitrogen and phosphorus." This limits the use of the term at present to the cerebrosids and phosphatids, instead of including all "constituents of protoplasm having a greasy feel soluble in alcohol-ether and insoluble in water," the sense in which the term is used by Mathews[1] and other American authors. The subjects discussed are the chemistry of the phosphatids—lecithin, cephalin, sphingomyelin, and cuorin; occurrence, methods of extraction, isolation, and purification of phosphatids; the cerebrosids—phrenosin and kerasin; protagon; allied lipins—carnaubon, paranucleo protagon, jecorin, and other insufficiently characterized substances; plant lipins; and the functions of lipins.

New observations on the decomposition of inulin and inulids in chicory root, B. GESLIN and J. WOLFF (*Compt. Rend. Acad. Sci. [Paris], 166 (1918), No. 10, pp. 428–430; abs. in Chem. Abs., 12 (1918), No. 13, pp. 1396, 1397*).—Further investigations on the effect of different yeasts on the inulids of chicory root (E. S. R., 38, p. 502) are reported and discussed.

Some constituents of the American grapefruit (Citrus decumana), H. P. ZOLLER (*Jour. Indus. and Engin. Chem., 10 (1918), No. 5, pp. 364–371, figs. 3; abs. in Analyst, 44 (1918), No. 508, pp. 270–272*).—This article gives a brief history of the grapefruit and reports analyses of some of the more important constituents of the peel and juice.

The peel when distilled at reduced pressure with steam yielded a greenish yellow oil with an odor of citral and having the following constants: Refractive index at 20° C., 1.475 and 1.478; optical rotation at 20°, +72.5 and −78.5; specific gravity at 20°, 0.845 and 0.86. Fractional distillation of the oil yielded the following constituents: *d*-limonene, 90 to 92 per cent; citral, 3 to 5; α-pinene, 0.5 to 1.5; geraniol, 1 to 2; linaloöl, 1 to 2; citronellal, trace; acetic, linalyl and geranyl esters, trace.

[1] Physiological Chemistry. New York: William Wood & Co., 1916, 2. ed., p. 61.

The residue remaining after the steam distillation of the peel on extraction with water yielded the glucosid naringin, which is the bitter principle of the grapefruit. Its empirical formula, as determined from carbon and hydrogen combustion and from a study of its cleavage products, appeared to be $C_{33}H_{42}O_{20}.4H_2O$ (air dried). There appeared to be a diminution of the naringin content during storage. Pectin was obtained from the peel after the removal of the oil and naringin by boiling for three hours and straining through cheesecloth. The average recoverable pectin is estimated at 10 per cent of the peel weight.

The pulp or juice was analyzed for citric acid, sucrose, and reducing sugars. The citric acid was found to decrease during storage and the reducing sugars and sucrose to increase.

The large sugar, pectin, and glucosid content of the grapefruit suggests the possibility of utilizing the whole grapefruit for the manufacture of commercial alcohol. The probable yield is estimated at from 10 to 15 gal. of proof spirit from 1 ton of grapefruit.

A bibliography of 42 references to literature on the subject is appended.

The edible litchi nut (Litchi chinensis), B. E. READ (*Journ. Amer. Chem. Soc., 40 (1918), No. 5, pp. 817–822; abs. in Analyst, 43 (1918), No. 508, pp. 272, 273*).—The edible litchi or Chinese hazel nut was found to be practically fat- and protein-free. The nitrogen-free extract was composed almost entirely of simple sugars, chiefly invert sugar. Citric acid was present, with possible traces of other fruit acids. Examination of the ash showed considerable amounts of calcium, magnesium, and iron, and of sulphate and phosphate ions. No iodin was found. The nut was not found to possess therapeutic properties ascribed to it in Chinese Materia Medica, but it is recommended as a good dietary supplement to foods rich in protein and to those lacking in mineral matter.

Yeasts for bread making (*Advisory Council Sci. and Indus., Aust., Rpt. Prog. Com. 1917, p. 38*).—A special study is reported of the growth in a malt wort of yeast leading to rapid ripening of the dough.

In the preparation of yeast it has been found that the temperature of the wort during the growth of the yeast should be less than the temperature at which the dough stands. Abundant oxygenation favors the development of yeast fermenting rapidly. The presence of flour in the wort prevents any check in fermentation when the yeast is mixed with the dough. The wort is made with a decoction of hops, to which flour and ground malt are added. The mixture stands at 155° F. until the whole of the starch disappears. After straining the mash from the liquor the wort is boiled and cooled rapidly, placed in a sterilized pan, and beaten to aerate the liquid. It is then inoculated by the addition of a considerable amount of stock from the previous brew and the yeast is allowed to grow for 16 hours. With yeast thus prepared the time of leaving the dough in the trough has been reduced to five hours.

A chemical study of enzym action, K. G. FALK (*Science, n. ser., 47 (1918), No. 1218, pp. 423–429*).—This is a general discussion of the subject, including a review of the work of other authors on the kinetics and chemical nature of enzym action and a brief survey of the scope, results and conclusions of investigations conducted by the author and collaborators (E. S. R., 38, p. 709).

Equilibria in solutions containing mixtures of salts.—I, The system water and the sulphates and chlorids of sodium and potassium, W. C. BLASDALE (*Journ. Indus. and Engin. Chem., 10 (1918), No. 5, pp. 344–347, figs. 6*).—This is the first of a series of papers comprising a study of the phase-rule diagrams representing the equilibria which exist in aqueous solutions between certain salts. The system discussed in this paper consists of four components, namely,

water and any three of the four salts concerned. The experimental methods used are described and equilibrium diagrams at 0, 25, 50, 75, and 100° C. are given with accompanying tables of composition of the saturated solution.

The separation of the chlorids and sulphates of sodium and potassium by fractional crystallization, W. C. BLASDALE (*Jour. Indus. and Engin. Chem., 10 (1918), No. 5, pp. 347–353, figs. 6*).—The data referred to above are utilized in suggesting and testing the efficiencies of methods for the separation of certain pairs of salts which yield a common ion and for the recovery of potassium salts from the ash of kelp and from certain natural brines found in the desert regions of California, Nevada, and Utah. The separations discussed are potassium chlorid from sodium chlorid and from potassium sulphate, potassium sulphate from sodium sulphate, sodium sulphate from sodium chlorid, the salts of potassium from mixtures containing sulphates and chlorids of sodium and potassium, and potash from ash of kelp and from desert brine.

The author concludes that "it is not improbable that when the diagrams representing the equilibria which must exist in solutions which contain carbonates as well as sulphates and chlorids of sodium and potassium have been prepared it will be found possible to suggest methods by which the salts present in such waters can be profitably separated into commercial products. It is also possible that it may be found commercially feasible to precipitate most of the CO_3 ion, either as $NaHCO_3$ or $CaCO_3$, from certain of these waters and recover the potassium salts in the residual solution by the methods already described."

Some limitations of the Kjeldahl method, H. C. BRILL and F. AGCAOILI (*Philippine Jour. Sci., Sect. A, 12 (1917), No. 5, pp. 261–265*).—This article reports determinations of the nitrogen content of various classes of nitrocarbons by means of the Kjeldahl method to determine what type of compound yields only a part of its nitrogen by this process.

Low results were obtained with pyridin, piperidin, quinolin, isoquinolin, oxyquinolin, pyrrol, and in some cases with nicotin. The authors believe this arises from the formation of sulphonic acid derivatives and their resistance to decomposition. The Gunning-Arnold method gives more reliable results with pyridin when heated for a considerable period after the solution has become clear. Sodium sulphate can not be substituted for potassium sulphate.

The nitrogen distribution of fibrin hydrolyzed in the presence of ferric chlorid, C. A. MORROW and W. R. FETZER (*Soil Sci., 5 (1918), No. 2, pp. 163–167*).—Duplicate analyses of the products of fibrin and fibrin plus ferric chlorid hydrolized in the presence of hydrochloric acid were made for the purpose of determining the effect on the distribution of the nitrogen in the hydrolysate of an iron compound such as might be present in mineral soils.

The results of the analyses showed that in the presence of ferric chlorid there is a substantial increase in ammonia nitrogen due to deamination of some amino acids at the temperature of hydrolysis, and that the acid-soluble humin nitrogen increases at the expense of a corresponding loss in the filtrate from the bases. This refutes the earlier conclusion of one of the authors (E. S. R., 37, p. 517), that the humin nitrogen precipitated by calcium hydroxid is of nonprotein origin. A part of this acid-soluble humin is of protein origin, possibly coming from one amino acid.

The authors conclude that the results have an important bearing on the application of the Van Slyke method to soil analysis, and that data obtained by this method can not in any way represent the distribution of protein nitrogen in the soil.

The estimation of potash in kelp and similar substances by means of perchloric acid (*Chem. Trade Jour., 61 (1917), No. 1597, pp. 553, 554*).—This

article reports a critical study of the perchlorate method of determining potash, depending upon the insolubility of potassium perchlorate in alcohol containing 60 per cent of perchloric acid. The method as modified consists of treating the soil with boiling hydrochloric acid to decompose the sulphids, precipitating the sulphates by solid barium hydroxid, and filtering under pressure. The potassium is then precipitated by perchloric acid in the usual way, and the potassium perchlorate is washed with 100 cc. of perchlorized alcohol.

The identification and estimation of zinc in water, R. MELDRUM (*Chem. News, 116 (1917), Nos. 3028, pp. 271, 272; 3030, pp. 295, 296; 3031, pp. 308–309*).—The methods investigated and discussed are (1) the film test which is considered reliable to the extent of 1 part of zinc in 200,000 parts of hard water containing calcium bicarbonate, (2) a colorimetric ammonium sulphid process sensitive to 1 part of zinc in 100,000 but of value only when the character and mineral constituents of the sample are known, and (3) a colorimetric ferrocyanid process sensitive to 1 part of zinc in 1,000,000 if a similar zinc-free water is available as a standard. The methods are described in detail.

The gasometric determination of combined carbonic acid, W. MESTREZAT (*Ann. Chim. Analyt., 23 (1918), No. 3, pp. 45–47, fig. 1*).—The method described is applicable to the determination of combined carbonic acid in alkaline hypochlorite solutions used as antiseptics and depends upon the fact that oil of turpentine rapidly absorbs chlorin and various gaseous chlorin derivatives but does not absorb carbon dioxid.

To 10 or 20 cc. of the chlorinated solution 1 cc. of oil of turpentine and a sufficient quantity of 2 N sulphuric acid are added. The chlorin is absorbed by the oil of turpentine and the carbon dioxid collected in a eudiometer.

A color reaction for the examination of flour, especially for the determination of the grade of sifting, E. CALENDOLI (*Ann. Ig. [Rome], 28 (1918), 2, pp. 76, 77*).—The method consists of adding a pinch of flour to a few cubic centimeters of concentrated hydrochloric acid. A color is produced which is violet if no bran is present but which becomes reddish brown in the presence of bran. By comparison with a set of standard colors an approximate valuation of the grade of flour can be made.

Quantitative colorimetric determination of pentosans in flour, G. TESTONI (*Staz. Sper. Agr. Ital., 50 (1917), No. 2, pp. 97–108*).—The method consists of hydrolyzing the pentosans of the flour at a temperature of from 45 to 50° C. by means of a mixture of 90 parts of glacial acetic acid and 10 parts of concentrated hydrochloric acid to which has been added a little phloroglucin. The solution is then diluted with 100 times its volume of water and the pentoses estimated by colorimetric comparison with a standard prepared from arabinose with phloroglucin. By hydrolyzing at the temperature given, danger of hydrolysis of the hemicellulose is prevented.

The method is considered by the author to be superior to the official Tollens method with which it is compared.

Italian tomato products, S. LUIGI and D. FILIPPO (*Ann. Ig. [Rome], 28 (1918), No. 3, pp. 117–130*).—This article reports the results of systematic analyses of tomato products. These include microscopic investigations and the determination of water, ash, sodium chlorid, toxic and antifermentative substances, and acidity of canned tomato soup, tomato sauce, and single, double, and triple concentrations of tomato juice.

Numerical data of a large number of analyses show that in a genuine tomato product, whatever its concentration, the percentage of ash is approximately one-tenth that of the dried extract. The acidity of the product does not follow a constant rule with relation to the amount of dry extract, as much depends upon the purity of the fruit and the method of preservation. The author sug-

gests that the price of various tomato products should be based upon the amount of dry extract normally contained in that type of product.

Arsenic in sulphured food products, W. D. COLLINS (*Jour. Indus. and Engin. Chem., 10 (1918), No. 5, pp. 360–364, figs. 2; abs. in Chem. Abs., 12 (1918), No. 13, p. 1400*).—The methods of analysis used in obtaining the data previously noted (E. S. R., 38, p. 9) are described in detail.

The value of the Walker method for determining casein in milk, A. ACHESINI (*Staz. Sper. Agr. Ital., 50 (1917), No. 2, pp. 109–114*).—A comparison of the Walker method (E. S. R., 31, p. 114) with other methods of determining casein in milk is reported. It is suggested that if the milk to be examined is fresh and does not give an acid reaction toward litmus, the approximate percentage of casein contained in it can be found by determining the acidity of the milk by neutralization with $\frac{N}{10}$ potassium hydroxid, using phenolphthalein as an indicator and multiplying the value found by the factor 4.7 which is the average result of a number of determinations of the ratio casein: acidity. The Walker reaction should be used in the estimation of casein in milk with a decidedly acid reaction.

A comparison of the reductase tests with other recent sanitary milk tests, C. BARTHEL (*Meddel. Centralanst. Försöksv. Jordbruksområdet, No. 141 (1917), pp. 32; K. Landtbr. Akad. Handl. och Tidskr., 56 (1917), No. 2, pp. 85–114; abs. in Chem. Abs., 11 (1917), No. 17, pp. 2511, 2512*).—The reductase test previously noted (E. S. R., 29, p. 206), is compared with the direct count method, the determination of ammonia in the milk, and the alizarin alcohol test noted by Morres (E. S. R., 22, p. 414). The author concludes that at the present time the reductase test is the safest and most convenient method to use.

The reductase test for milk, P. S. ARUP (*Analyst, 43 (1918), No. 502, pp. 20–31*).—This is a study of the relative influence of various factors on the accuracy of the reductase test for milk (E. S. R., 29, p. 206). The principal change recommended in the technique of the test is the reduction of the temperature from 38 to 28 or 29° C. This avoids errors of underestimation in raw milk, which is likely to contain organisms whose activity is impaired at the higher temperature, and of overestimation in pasteurized milk, since the organisms surviving pasteurization are probably more active at the higher temperature. The period of time should be increased if the test is carried out at the lower temperature.

The method is considered to afford a reliable means of distinguishing between good, bad, and indifferent milk and of checking the efficiency of pasteurization.

The determination of glutose in cane molasses, H. PELLET (*Bul. Assoc. Chim. Sucr. et Distill., 34 (1917), No. 10–12, pp. 312–327*).—The author describes a method of determining glutose in cane molasses after fermentation of the molasses for from 72 to 84 hours. As the result of the investigations reported the conclusions are drawn that glutose does not exist in the juice of the sugar cane, but that it is the result of the action of a slight alkalinity, under the influence of heat, on the levulose which is present in all cane juice in variable proportions and which is found in large amounts in the final molasses.

The nonrelation between the purity of sugars and filtration of the sirups prepared for refining, H. PELLET (*Bul. Assoc. Chim. Sucr. et Distill., 35 (1917), No. 7–9, pp. 183–186; abs. in Chem. Abs., 12 (1918), No. 9, p. 1008*).—The author discusses the filtration of sugar solutions and states that there is no relation between the purity value or "titrage" of sugars and the rapidity of filtration of sirups prepared from them. Beet sugar gives sirups which filter more readily than sugar-cane sirups. The rapidity of the filtration of the latter

depends upon the mode of extraction of the sugar and the process followed in purifying the juices obtained.

A short handbook of oil analysis. A. H. GILL (*Philadelphia and London: J. B. Lippincott Co., 1918. 8. ed., rev., pp. 209, figs. 14*).—The changes in the eighth edition of this handbook, previously noted (E. S. R., 22, p. 12), include a description of the new MacMichael viscosimeter and a means of the reduction of viscosimetrical readings to absolute units or poises. One or two minor tests for lubricating oils have been added. The special tests, methods of analysis, and the description of the special oils and greases have been revised where necessary, particularly in the case of the drying oils, and the methods of analysis of edible and hardened fats and oils included.

The precipitin test for blood, L. HEKTOEN (*Jour. Amer. Med. Assoc., 70 (1918), No. 18, pp. 1273–1278, figs. 2*).—The precipitin test for blood is discussed primarily from the medicolegal point of view. The methods in use for the production of precipitin serum and for strength and specificity tests of the serum are described. Directions are given for the preparation of material for the precipitin test and for the technique of the test. Factors that may interfere with the reaction are discussed, and other uses of the test and special methods for the differentiation of blood of closely related animals are suggested.

A new method of determining chlorids in blood, M. DUGARDIN (*Ann. Chim. Analyt., 23 (1918), No. 3, p. 59*).—The method is as follows:

Ten cc. of the serum is treated with an equal volume of a 20 per cent solution of trichloracetic acid to precipitate the proteins. After stirring and filtering, 10 cc. of the filtrate is heated with 15 cc. of $\frac{N}{10}$ silver nitrate. To this are added 25 cc. of distilled water, 5 cc. of nitric acid, and 5 cc. of a 10 per cent solution of iron alum, and the excess of silver is titrated with $\frac{N}{10}$ potassium sulphocyanid in the usual way. As trichloracetic acid sometimes contains free hydrochloric acid or chlorids, a correction determination should be made.

A method for detecting small quantities of chloretone (trichlorotertiarybutyl alcohol) in aqueous solutions, T. B. ALDRICH (*Jour. Biol. Chem., 34 (1918), No. 2, pp. 263–267*).—The water solution of chloretone is distilled with steam and the distillate boiled for one-half hour, using a reflux condenser. The chloretone crystallizes in fine needles in the condenser. The method is said to be certain for less than 1 mg. of chloretone and may be used in the presence of other substances, such as oils, fats, acids, salts, etc., thus lending itself admirably to the detection of the drug in the fluids and tissues of the body. Organic solvents, however, dissolve chloretone and prevent its recognition by this method.

Survey of tanning materials in the Belgian Kongo, E. NIHOUL (*Bul. Agr. Congo Belge, 8 (1917), No. 3–4, pp. 312–319, figs. 2*).—This article includes a description of the methods commonly employed in the determination of tannin, practical details on the analysis of tannins by the method of the International Association of Tannery Chemists, and directions for the gathering and preservation of samples of tanning materials.

The quantity and nature of the unfermentable sugar of cane molasses, H PELLET (*Bul. Assoc. Chim. Sucr. et Distill., 35 (1917), No. 7–9, pp. 178–182; abs. in Chem. Abs., 12 (1918), No. 9, p. 1007*).—After fermentation with yeast under favorable conditions of temperature, acidity, and concentration, from 1 to 2 per cent of the total sugar of beet molasses and from 4 to 8 per cent of the sugar of cane molasses remain unfermented. This is in agreement with the

report of Peck and Deerr (E. S. R., 21, p. 578). The unfermentable sugar is considered to be glutose.

Concord grape juice: Manufacture and chemical composition, B. G. HARTMANN and L. M. TOLMAN (*U. S. Dept. Agr. Bul. 656 (1918), pp. 26, fig. 1*).—This publication reports a study of the manufacture and chemical composition of commercial Concord grape juice. Suggestions are given for the proper handling and storage of the grapes, and the various steps in the process of juice manufacture are described in detail.

Tables are given of the composition of the juice at the time of storing and after four months' storage. The data show that there is a substantial decrease in solids during storage, about one-half of which is accounted for by the precipitation of cream of tartar and earth alkali tartrates, and the other half by the precipitation of pectin bodies and gums. There is a definite decrease in nonsugar solids, total acids, total tartaric acid, and alkalinity of the ash. There is no material change in the sugar content of the juice.

The analyses of 104 commercial juices from six different factories indicate that, if properly prepared, a Concord grape juice contains less than 0.4 per cent of alcohol by volume and no sucrose. It contains free tartaric acid, cream of tartar to the extent of about 0.54 gm. per 100 cc., and about 0.5 gm. of free malic acid per 100 cc.

The canning of fruit and vegetables (*Bd. Agr. and Fisheries [London], Food Prod. Leaflet 34 (1918), pp. 12*).—This pamphlet gives general directions for the home canning of fruits and vegetables.

Home canning and drying of vegetables and fruits (*Washington: Nat. War Garden Com., 1918, pp. 31, figs. 49*).—This manual contains detailed instructions for canning and drying vegetables and fruits, with directions for making jellies and fruit butters and for fermentation, salting, and pickling.

Drying as a method of food preservation in Hawaii, M. O. JOHNSON (*Hawaii Sta. Ext. Bul. 7 (1918), pp. 31, figs. 4*).—The principles and methods of drying are discussed in their relation to Hawaiian conditions. The construction and use of a homemade air drier of 150 to 200 lbs. capacity are described. Results are given of experiments in drying the banana, taro, cassava, sweet potato, edible canna, and Irish potato. Tables are given of the proximate analyses of taro, cassava, and sweet potatoes; the comparative yields and costs of flours prepared from various raw materials; and a comparison of analyses of wheat flours and proposed substitutes for flours.

Of the various wheat flour substitutes, flour made from the cassava root appears the most promising as being the finest, whitest flour with the lowest cost of production.

Split pea production and industry (*Bul. Dir. Gén. Agr., Com. et Colon., Tunis, 21 (1917), No. 92, pp. 185–188*).—In this article are described the processes employed in Tunis in the preparation of three varieties of split peas: (1) Evaporated split "petits pois," (2) ordinary split peas, and (3) malted split peas. For the first variety, young, fresh peas are dried in an evaporator before being decorticated, for the second, mature, dried peas are used, and for the third, the peas undergo a preliminary malting process to increase the sugar content.

Influence on linseed oil of the geographical source and variety of flax, F. RABAK (*U. S. Dept. Agr. Bul. 655 (1918), pp. 16*).—During two successive seasons four selected varieties of flax were grown in widely separated localities having different soil and climatic conditions. The oil was extracted from the seeds thus obtained and the color, specific gravity, index of refraction, acid, saponification, and iodin values, and drying power determined. Ether extraction was used to determine the actual yield of oil in the seeds, and

the method of cold expression to obtain samples for the determination of physical and chemical constants.

The analytical data, which are reported in tabular form, led to the following conclusions: Varieties of flax possessing agronomic differences also differ in both the physical and chemical properties of the oils. These properties are maintained to a marked degree from season to season. The yields of oil were found to vary with the variety of flax as well as with the locality. The specific gravity, index of refraction, and color can not be so easily correlated with variety or locality. Oils combining high acidity with high specific gravity and a relatively high iodin number dry to a firm film most rapidly. The lightest colored oils invariably possess the most rapid drying properties.

Toluol from spruce turpentine, A. S. WHEELER (*Jour. Indus. and Engin. Chem., 10 (1918), No. 5, pp. 359, 360*).—This is a preliminary report of experimental work with spruce turpentine to obtain toluene and cymene by the Friedel-Crafts reaction with benzene and aluminum chlorid. By fractional distillation samples were obtained which were easily converted into trinitrotoluene, thus indicating the possibility of utilization of spruce turpentine as a source of toluene (E. S. R., 38, p. 810).

METEOROLOGY.

Monthly Weather Review (*U. S. Mo. Weather Rev., 46 (1918), Nos. 1, pp. 5, pls. 9, figs. 6; 2, pp. 55–113, pls. 17, figs. 8*).—In addition to weather forecasts, river and flood observations, and seismological reports for January and February, 1918; lists of additions to the Weather Bureau Library and of recent papers on meteorology and seismology; notes on the weather of the months; solar and sky radiation measurements at Washington, D. C., during January and February, 1918; condensed climatological summaries; and the usual climatological tables and charts, these numbers contain the following articles:

No. 1.—Mathematical Theory of Sound Ranging (illus.), by H. Bateman; Mean Values of Free-air Barometric and Vapor Pressures, Temperatures, and Densities Over the United States, by W. R. Gregg; The Turning of Winds with Altitude, by W. R. Gregg; Halo of January 10, 1918, at Boulder, Colo., by O. C. Lester (abs.); Diffraction of Light in the Formation of Halos, by S. W. Visser (reprinted abs.); Horizontal Oscillation of the Free Atmosphere up to 10 km., at Batavia, by W. van Bemmelen and J. Boerema (reprinted abs.); Early Use of Kites in Military Operations, by Co-Ching Chu (abs.); Air Chimneys of Ice Below a Waterfall (illus.), by R. E. Horton; Cyclones, Tornadoes, Thunderstorms, Squalls, by A. J. Henry; Determination of Ozone and Nitrogen Oxids in Southern India, by F. L. Usher and B. S. Rao (reprinted abs.) (see p. 210); Pitfalls of Meteorological Periodicities, by W. W. Bryant (reprinted); Relation Between Barometric Pressure and the Water Level in a Well at Kew Observatory, by E. G. Bilham (reprinted); Phenomena Connected with Turbulence in the Lower Atmosphere, by G. I. Taylor (reprinted); Swiss Society of Geophysics, Meteorology, and Astronomy; Lawrence Hargrave, 1850–1915, by R. Greig-Smith; and Frank Plummer, 1868–1918, by G. N. Salisbury.

No. 2.—Nocturnal Radiation Measurements (illus.), by H. H. Kimball; Molecular Scattering of Light, by C. Fabry (reprinted); Partial Correlation Applied to Dakota Data on Weather and Wheat Yield, by T. A. Blair (see p. 210); Nomenclature of the Unit of Absolute Pressure, by C. F. Marvin; United States Daylight-saving Act of March 19, 1918; Diagrams Showing Conditions and Effects of the Daylight-saving Act, by C. F. Marvin; "Summer Time" and the British Meteorological Office, by N. Shaw (abs.); "Summer

Time" or Daylight Saving in Other Countries; Rainfall of 1917 in the British Isles (reprinted) (see below); Weather and Honey Production, by L. A. Kenoyer (E. S. R., 37, p. 854); and Former Weather Bureau Official in Naval Reserve Flying Corps.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTHAUS and A. L. CHANDLER (*Massachusetts Sta. Met. Bul. 351-352 (1918), pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during March and April, 1918, are presented. The data are briefly discussed in general notes on the weather of each month.

Partial correlation applied to Dakota data on weather and wheat yield, T. A. BLAIR (*U. S. Mo. Weather Rev., 46 (1918), No. 2, pp. 71–73*).—Continuing previous work (E. S. R., 33, p. 117), the method of partial correlation was applied in the study of the relation between May and June rainfall and the yield of spring wheat in the Dakotas. The conclusions reached were as follows:

"The precipitation of May and June and the temperature of June are important factors, but not the only important factors, affecting the yield of wheat in the Dakotas. A considerable part of the apparent effect of either precipitation or temperature upon yield is really due to the accompanying effect of the other. In North Dakota the influence of precipitation is greater than that of temperature, while the reverse is true in South Dakota. When the precipitation of May and June is above the average in the Dakotas the temperature of June is generally below the average, and inversely."

The rainfall of 1917 [in the British Isles] (*Symons's Met. Mag., 52 (1918), No. 624, pp. 133, 134; abs. in Nature [London], 100 (1918), No. 2520, p. 422; U. S. Mo. Weather Rev., 46 (1918), No. 2, p. 78*).—It is stated that the rainfall of 1917 in the British Isles was about normal, although there were large areas of deficient rainfall in different parts of the country, especially in the center, part of the north, and the southwest of England, as well as the east midlands of Scotland, the southern half of Ireland, and the extreme north and south of Wales, the deficiency in these areas varying from 10 to 20 per cent of the normal. "Unusually wet regions included the west and north of Scotland, the north of Ireland, the Yorkshire Wolds, Cardigan Bay, and the London district. August, October, and November showed a general excess of rainfall over the country. May was rather wet in Ireland and June in England, especially locally. February and December were unusually dry, and there was on the whole a general deficiency of rainfall during the first seven months of the year."

The determination of ozone and oxids of nitrogen in the atmosphere, F. L. USHER and B. S. RAO (*Jour. Chem. Soc. [London], 111 (1917), No. 658, pp. 799–809, fig. 1; abs. in U. S. Mo. Weather Rev., 46 (1918), No. 1, p. 25*).—A modification of Rothmund and Burgstaller's method is described and the results of examinations of samples of air by the method are reported.

Of the 14 complete determinations made, 12 showed no ozone, hydrogen peroxid, or nitrogen peroxid. In two cases nitrogen peroxid was observed to the extent of 1 part in from 4,000,000 to 5,000,000 of air. The results indicate that ozone and nitrogen peroxid never occur together in the atmosphere.

SOILS—FERTILIZERS.

Reconnoissance soil survey of the San Diego region, Cal., L. C. HOLMES and R. L. PENDLETON (*U. S. Dept. Agr., Adv. Sheets Field Oper. Bur. Soils, 1915, pp. 77, pls. 4, fig. 1, map 1*).—This survey, made in cooperation with the

California Experiment Station, deals with the soils of an area of 2,036,480 acres in the extreme southwestern corner of the State comprising the western watersheds of San Diego County, together with small parts of Riverside and Orange Counties. The topography of the area is predominantly mountainous, with a belt along the western margin consisting of an elevated, dissected coastal plain. This plain attains elevations of from 500 to 600 ft. above sea level, while the mountain peaks and ridges rise to 3,000 and 4,000 ft. with a maximum elevation of 6,515 ft. Numerous flat-bottomed basins or small valleys occur among the mountain ranges. The valley areas, table-lands, and lower slopes are well drained, while the mountainous regions have excessive drainage. The area is characterized by a wet winter and dry summer. The mean annual rainfall varies from less than 10 in. in certain places along the coast to over 35 in. in some of the elevated inland situations.

The soils of the area are described as residual, from consolidated rocks; as coastal plain and old valley-filling material, from old unconsolidated water-laid deposits; and as recent alluvial, occurring as alluvial fans in the valleys and mountain basins. Rough stony land and rough broken land occupy 50.5 and 7.7 per cent, respectively, of the total area. In addition to these nonagricultural materials, 30 soil types of 18 series are mapped, exclusive of small areas of tidal marsh and coastal beach and dune sand. The region is prevailingly one of brown soils of sandy loam texture, the Sierra sandy loams and Holland sandy loams occupying 9 and 7.5 per cent, respectively, of the total area.

Soil survey of **Hillsborough County, Fla.**, C. N. MOONEY, T. M. MORRISON, O. B. JONES, E. C. HALL, and N. M. KIRK (*U. S. Dept. Agr., Adv. Sheets Field Oper. Bur. Soils, 1916, pp. 42, fig. 1, map 1*).—This survey deals with the soils of an area of 668,800 acres in the west-central part of the Florida Peninsula, Tampa Bay extending well into the county from the southwest. The topography of the area varies from level to rolling and hilly, with tidal marshes bordering the bay, beyond which is a wide belt of low coastal flatwoods ascending gradually toward the interior. The flatwoods area is poorly drained, and the uplands are marked by the absence of surface streams. The higher interior section, however, is drained by several large streams and their tributaries.

Most of the soils in the county were derived from unconsolidated marine sediments washed from the Piedmont Plateau. In addition there are areas of alluvial, residual or partly residual, and cumulose soils. Ten soil types of 9 series are mapped, besides swamp, water and grass, tidal marsh, muck, peaty muck, made land, and shell mounds. Leon fine sand, Norfolk fine sand, and Portsmouth fine sand predominate, occupying 31.3, 19.9, and 18 per cent of the total area, respectively.

Soil survey of **Brooks County, Ga.**, A. T. SWEET and B. W. TILLMAN (*U. S. Dept. Agr., Adv. Sheets Field Oper. Bur. Soils, 1916, pp. 42, pls. 5, fig. 1, map 1*).—This survey, made in cooperation with the Georgia College, deals with the soils of an area of 305,920 acres in south-central Georgia lying wholly within the Coastal Plain region. The prevailing topography of the county consists of low, broad ridges and almost level areas, but in many places low, well-rounded hills occur, and a few flat, depressed areas. The drainage is generally well established.

The soils of the county, which are of Coastal Plain origin, are derived from unconsolidated sediments of late geological age and are all sandy in character, ranging from medium or coarse in the western or northern parts to fine and very fine in the southeastern part. Considerable alluvium has been deposited along the larger streams, with the development of terraces in some places, in addition to overflow first bottoms. Seventeen soil types of 10 series are

mapped, exclusive of swamp. Norfolk sandy loam and Ruston sandy ... predominate, occupying 24.1 and 14.8 per cent of the total area, respectively.

Soil survey of Eastland County, Tex., W. G. SMITH, J. H. AGEE, W. I. WATKINS, and W. A. ROCKIE (*U. S. Dept. Agr., Adv. Sheets Field Oper. Bur. Soils, 1916, pp. 37, fig. 1, map 1*).—This survey deals with the soils of an area of 555,200 acres in central Texas. "The northern third of the county is rather deeply cut and steep-sided valleys, with more or less rough and ... intervening upland areas. Over the remainder of the county the valleys ... less deeply carved and are bordered by more gentle slopes, and the intervening uplands include more extensive areas of level to gently sloping and ... land. Second bottoms or terraces occur inextensively in more or less ... bodies along the principal streams. Overflowed first bottom lands are ... tensively developed, but occur in strips of very irregular width." The elevation of the area ranges from 1,250 to 1,750 ft. above sea level. The streams of the county are small and largely intermittent.

The soils of the county include those residual from sandstone, shale, conglomerate, and from limestone; those derived from outwash-plain or valley-filling material; and those of recent alluvial origin. Fifteen soil types of 8 series are mapped, in addition to rough stony land. Windthorst fine sandy loam and Nimrod fine sand predominate, occupying 18.4 and 17.7 per cent, respectively, of the total area.

Soil survey of Taylor County, Tex., W. G. SMITH, A. E. KOCHER, R. ROGERS, and W. I. WATKINS (*U. S. Dept. Agr., Adv. Sheets Field Oper. Bur. Soils, 1915, pp. 49, figs. 2, map 1*).—This survey deals with the soils of an area of 581,120 acres lying just northwest of the center of the State. Remnants of the Edwards Plateau form a strip of country of very irregular outline, from 2 to 16 miles wide, comprising a little more than one-fourth of the area of the county. The elevation of these plateaus is from 200 to 300 ft. above that of the general level of the county, which has an approximate elevation of from 1,750 to 2,000 ft. The surface topography of the plateaus varies from level to gently rolling, and that of the remainder of the county from gently rolling to nearly level. Drainage is complete.

The soils of the county are derived directly as residual soils or indirectly as stream bottoms, terraces, and terrace plain soils from limestone, shale, sandstone, and conglomerate rocks. Twenty-six soil types of 9 series are mapped, exclusive of rough stony land. Clay loams, silty clay loams, silty clays, and clays occupy about 45 per cent of the county, and loams, fine sands, and fine sandy loams about 27 per cent. The remaining area comprises stony and gravelly lands.

Soil survey of Jefferson, Berkeley, and Morgan Counties, W. Va., W. J. LATIMER (*U. S. Dept. Agr., Adv. Sheets Field Oper. Bur. Soils, 1916, pp. ... pls. 2, fig. 1, map 1*).—This survey, made in cooperation with the State Geological Survey, deals with the soils of an area of 492,160 acres in the extreme eastern part of the State lying wholly within the Appalachian Valley region. Topographically the area consists of a series of narrow mountain ridges rising abruptly from rather broad and fairly smooth intervening valleys. The valleys range from 500 to 800 ft. above sea level, and the mountains from 1,000 to 1,500 ft. above the valleys. The area is drained mainly by the Potomac River and its tributaries, and drainage is generally well established.

The soils of the area are chiefly residual in origin, being derived from the sedimentary rocks consisting of limestone, shale, and sandstone. Soils of the River Flood Plains province occur along the streams, and consist of old alluvial and recent alluvial deposits. Twenty-five soil types of 13 series are mapped, in addition to rough stony land. Hagerstown silt loam, Dekalb shale loam,

...ough stony land predominate, occupying 17.7, 17, and 11 per cent of the ... area, respectively.

Studies on capacities of soils for irrigation water and on a new method of determining volume weight, O. W. ISRAELSEN (*Jour. Agr. Research [U. S.], ..., No. 1, pp. 1–36, pl. 1, figs. 14*).—This is an account of work done in ...ion with a study of the economical duty of water for alfalfa in the ...mento Valley, Cal., which was carried on from 1910 to 1915 as a part of ...operative irrigation investigations of the U. S. Department of Agricul..., the State Department of Engineering, and the California Experiment ...n.

...servations on the capacities of certain kinds of soils under different con...ns to retain water are reported and the "relation between the depth of ...er necessary to add a given percentage of moisture to a certain depth of ... of given volume weight is expressed mathematically and graphically. ...bservations of capacity of soils to retain water are based on 9,584 moisture ...erminations in the upper 6 ft. of soil, 672 in the depth from 7 to 9 ft., and ... in the tenth to twelfth foot sections, making 10,448 in all. Volume weight ...erminations upon which the pore-space values largely depend and by which ... percentages of water were converted to inches of water per foot of soil ... made upon the soils in place to a depth of 6 ft.

"The observations indicate that the percentages of pore space which are filled ... the water that a soil holds immediately after irrigation increase with the ...ease in fineness of soil texture. Variations from 40 per cent in silt-loam ... having fine sandy-loam subsoils, 51 per cent in silt loams, 58 per cent in ... loams, to 66 per cent in the clay soils have been noted. The ratio of the ...mum capillary capacities of soils, as determined in a 10-in. tube in the ...oratory, to that of the same soils observed in the field after irrigation varied ... 1.78±0.06 to 1.98±0.14. Correlations between the moisture equivalent ... the maximum amounts of water found after irrigation show a gratifying ...ement and suggest that the moisture equivalent might be made a basis ...lging maximum capillary capacities.

"A new method of determining volume weight of soil in place which is simple ...manipulation and inexpensive is described." In this method the volume of ... auger hole made in taking soil samples to a depth of 6 ft. was measured ... inserting a very thin-walled elastic rubber tube into the hole and filling it ...h water from a graduated cylinder. Laboratory volume-weight determina... were made upon the soil removed from the hole, as follows: "Brass tubes ... in. in diameter and 10 in. long were filled with thoroughly pulverized air-dry ... on the Bowman compactor. The weight of the soil was corrected for ...roscopic moisture, and the volume of the tube was computed and also deter...ed by filling it with water." A comparison of the volume weights ob...d by the two methods showed wide variations. The volume weight of a ... soil was decreased nearly 23 per cent by being disturbed while that of a ... sandy loam was increased 15 per cent.

"The most striking factor brought out by the study of the volume weight of ... soil in place . . . is the fact that the coarse-textured soils have in general ...ch lower volume weights than the fine-textured ones, a relation just the re...se of that which is generally believed to exist between texture and volume ...ght. . . . The results of the new method of determining the volume weight ... clay-loam soil, as checked by a paraffin-immersion method first used by Charles F. Shaw and by the use of an iron tube, were subject to an error of less ...an 1 per cent."

A list of 12 references to literature cited in the article is given.

Relation of the mechanical analysis to the moisture equivalent of soils. A. SMITH (*Soil Sci., 4 (1917), No. 6, pp. 471–476*).—A further contribution to the study of the relation between the moisture equivalent and the mechanical analysis of soils, based on experimental results obtained in the laboratory of the division of soil technology, University of California. The moisture equivalent of 12 different soil types, ranging in texture from coarse sand to clay and in origin from residual to recent alluvial, was determined by use of the centrifuge designed by Briggs and McLane (E. S. R., 19, p. 416), and a mechanical analysis made by the Bureau of Soils method, special care being exercised in the separation into the seven groups of soil particles.

All of the particles of the same group were combined, and the moisture equivalent for each composite group of soil separates determined, the moisture equivalent varying from 1.18 per cent for fine gravel to 61.03 for clay. Specific gravity determinations were also made for each group and were found to vary from 2.64 to 2.69, indicating that the mechanical analysis gave seven grades of soil material which differed mainly in the size of the particles constituting any one group, and not in any marked variation in mineral content. It is concluded from the results of these determinations that "to use the mechanical analysis as an indirect method for the calculation of the moisture equivalent the investigator must give to each textural grade a definite and distinct value and not disregard the sands, or group three or four grades into one."

Three synthetic soils were made up from the grades of soil particles representing loam, sandy loam, and fine sandy loam, and the moisture equivalent for each was determined. In comparing the values obtained with those calculated for these soils from the values for the moisture equivalent as determined for each separate, it was found "that the calculated moisture equivalent is practically the same as the determined when separate values are given to the seven individual grades of texture, and not when determined by totaling the five grades of sand or disregarding the sands and just considering the silt and clay content of a soil."

Further mechanical analyses and moisture equivalent determinations of various types of soil are briefly discussed and are said to have shown wide variations between the calculated and the determined moisture equivalents. The author maintains "that one formula will not hold in all cases, if that formula is calculated by means of least squares as was done by Briggs and McLane [E. S. R., 19, p. 416; 26, p. 421] or by direct determination of the moisture equivalent for the various separates, as was tried in this laboratory. One factor . . . overlooked by most investigators has been the influence of the shape of the soil particles on the moisture retentiveness of soils or on their moisture equivalent. . . .

"It was thought at first . . . that it would be possible to have one formula to be used for residual soils, another for 'wind-laid,' another for recent alluvial, etc., which might take care of the shape of the soil particles. When one, however, sees how the surface soil of residual origin . . . has the same mechanical analysis as the subsoil of the same origin and yet a considerably lower moisture equivalent, while on the other hand, a recent alluvial surface soil has the same mechanical analysis as its subsoil yet a considerably higher moisture equivalent, it is evident that any suggested formulas for calculating a constant such as the moisture equivalent from the mechanical analysis of soils are far from accurate. . . .

"From the data given it is felt that while the moisture equivalent calculated from the mechanical analysis according to the formulas suggested gives approximate results, nevertheless they are far from accurate for scientific work.

will be necessary to make an actual moisture equivalent determination satisfactory results."

The moisture equivalent determinations of salt-treated soils and their relation to changes in the interior surfaces, L. T. SHARP and D. D. WAYNICK (*Soil Sci., 4 (1917), No. 6, pp. 463–469, fig. 1*).—The authors present experimental data obtained in a study of the effects upon the physical properties of a clay-loam soil of adding different concentrations of sodium salts, including the chlorid, sulphate, carbonate, hydroxid, nitrate, and acetate, and of ammonium chlorid; and of removing the salts by washing with distilled water, as indicated by moisture-equivalent determinations. A theoretical conception of the comparative magnitudes of the interior surfaces of soils based upon the moisture equivalent is also presented, the thesis being that "the optimum physical conditions for plant growth in such heterogeneous mediums as the soil mass must obviously depend in some measure upon the interfaces between the various phases and the factors affecting them."

Duplicate 100-gm. portions of soil passed through a 2-mm. sieve were treated with 50 cc. of the various salt solutions. The salts were washed from a portion of the soils before centrifuging and the moisture equivalent determined by the method described by Briggs and McLane (E. S. R., 10, p. 416). The soil treatments and moisture equivalents obtained are presented in tabular form. In discussing the results it is stated that "on the whole, it can be said that while the added salts are present in the soil, little or no change in the moisture equivalent was observed. A very different effect is produced if these same salts are washed from the soil with water. The soils so treated seem to possess a new and peculiar set of physical properties."

The moisture equivalent of the Davis soil was markedly increased by such treatments, the extent depending upon the salt used. The washing out of all the sodium salts was accompanied by a considerable increase in the moisture equivalent, while the washing out of calcium chlorid did not perceptibly alter this factor. "Since the leaching out of other salts as potassium chlorid, potassium sulphate, potassium nitrate, and ammonium sulphate produces an effect somewhat similar to that existing after the sodium salts have been leached from the soil, it is highly probable that the washing out of the salts first mentioned would produce effects on the moisture equivalent commensurate with those noted when sodium salts have been leached from the soil. The amount of change in the moisture equivalent due to leaching seems to depend also upon the base with which the sodium is associated. In the experiment reported sodium sulphate produced the greatest effect, followed in order by sodium hydroxid, sodium carbonate, and sodium chlorid. . . .

"The absolute quantity of salt with which the soil has been treated is likewise an important factor in determining the extent to which the soil will be affected. The larger applications followed with washing of salts invariably produced the greater effects on the moisture equivalent. The two smaller applications of sodium carbonate and sodium hydroxid were without a measurable effect."

The authors conclude "that the salt and water treatments have increased the interior surface of the soils from 2 to 40 per cent, the magnitude of the increase depending upon factors which have already been mentioned. The salts alone have not measurably affected the interior surface."

The treatment of alkali soil, F. B. HEADLEY (*U. S. Dept. Agr., Bur. Plant Indus., Work Truckee-Carson Expt. Farm, 1916, pp. 17, 18*).—The plan of treatment of an alkali soil, comprising tile drainage and applications of gypsum and manure, as undertaken in 1914 is outlined. Sweet clover and alfalfa were seeded on the plats in 1915, and the first crop was harvested in 1916. All

treatments gave increased yields over the checks, but the effect of the ... treatments is not deemed comparable, due to the variability of the soil. ... clover outyielded adjacent plats of alfalfa in every case.

Soil acidity as influenced by green manures, J. W. WHITE (*Jour. ... search [U. S.], 13 (1918), No. 3, pp. 171–197*).—From the results of ... periments at the Pennsylvania Experiment Station with various legu... and nonleguminous plants and some common weeds and less desirable ... applied to a distinctly acid soil both in the fresh and air-dry condi... conclusion is drawn "that fresh green manures plowed under on the ... silty loam soil reduce its acidity very soon after plowing under, but ... leaves a soil of increased acidity. Also that nitrification goes on in the ... vigorously under suitable moisture, temperature, and aerative conditio... that the green manured soils are rich in nitrates, despite the soil a... As to the cause of the increased acidity, beyond showing that it is not ... due to nitrification and indicating that it is in some way associated w... added organic materials or their fermentative residues, the experiments ... nished little definite information."

The changes taking place during the storage of farm-yard manure, E. J. RUSSELL and E. H. RICHARDS (*Jour. Agr. Sci. [England], 8 (1917), No. ... 495–563, figs. 10*).—The investigations here reported "began in an attempt ... account for the loss of nitrogen that occurs during the cultivation of land ... in organic matter or liberally supplied with farmyard manure," as obse... for example, in the Rothamsted plats. As the work progressed, however ... was extended to "deal with the changes in the manure heap independ... of their bearing on the changes within the soil." It has included labora... experiments, investigations on the changes which go on in manure in the s... and in the heap, and studies of the relationship between composition and ... producing value of manure. A comparative study was also made of the ... which take place in the purification of sewage and those occurring in the ... composition of manure.

There was found to be a complete parallel between the decomposition ... sewage and manure and a close resemblance between these and the labora... decomposition of protein. It is concluded "that the decompositions in ... cases start in the same way. Under strictly anaerobic conditions they rem... the same, but under aerobic conditions further reactions, notably formati... of nitrate and loss of nitrogen, set in both in sewage and in manure heap ... which mask the general similarity with the degradation of protein as it h... been studied in the laboratory."

Special methods and apparatus used to prove that the loss of nitrogen observ... is due to the escape of free nitrogen are described. It was found, however ... that under completely anaerobic conditions there was no loss of nitro... although there was a breaking down of complex nitrogen compounds to a... monia, the accumulation of which was greater at 26° C. than at 15°. Nor ... was there any loss of nitrogen under completely aerobic conditions. Loss ... nitrogen due to the escape of free nitrogen occurred only under mixed aer... and anaerobic conditions which occur when air diffuses in the manure. The ... periments showed that nitrification takes place in the manure heap in t... presence of air and in the absence of much moisture. It was always obser... on the outside layer when drying had occurred, but was never found in t... lower depths that had remained moist.

In laboratory experiments under anaerobic conditions it was found that ... much as 17 per cent of the dry matter of the manure may be converted i... gas. In the heap the proportion is less. The nonnitrogenous constitu... particularly, are affected, as much as one-quarter of the pentosans disap...

; the process and other constituents breaking down in like proportion. s evolved contained carbon dioxid, marsh gas, and hydrogen. Under conditions the loss of dry matter was greater and the temperature than under anaerobic conditions. The gases involved contained no or marsh gas.

authors conclude that the practical aims in the management of manure, to secure as much dry matter and ammonia and as little loss of nitro- possible, are not attained in manure heaps however well put up. "It that the heap is at best an imperfect method of storage, but that its are lessened by keeping it compact and sheltered, where it will neither ashed by rain nor suffer too much loss on drying, and in particular by summer storage."

thod of leaving manure under the animals in stalls or covered yards it is wanted is thought to be the best that can be suggested with our knowledge. "If the manure has to be stored it should be under conditions, and if possible at a temperature of about 26°."

analyses of manure from various sources are compiled from which the g averages are deduced:

Average composition of different kinds of manure.

Kind of manure.	Total nitrogen.	Ammoniacal nitrogen.	Amid nitrogen.	More complex nitrogen compounds.	Phosphoric acid (P_2O_5).	Potash (K_2O).
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
	0.62	0.12	0.08	0.42	0.26	0.72
	.43	.09	.03	.29	.19	.44
	.54	.13	.04	.34	.23	.54

Historical development of scientific knowledge regarding the decomposi- l preservation of manure is reviewed.

l fertility work on county experiment farms, C. E. THORNE (*Mo. Bul. ta., 3 (1918), No. 4, pp. 101-103*).—This presents a brief preliminary re- the results of fertilizer tests conducted during 1916 and 1917 along the eneral lines as previously noted (E. S. R., 36, p. 829). The conclusion eached that on the older soils of Ohio acid phosphate could be used to dvantage. High yields were also obtained with potash and nitrogen ation, but at present prices the use of these materials is deemed to be table for the average farmer.

ying commercial fertilizers, C. E. THORNE (*Mo. Bul. Ohio Sta., 3 (1918), pp. 139-141*).—Tabulated data obtained from the fertilizer experiments ove are presented to show the total and net value, after deducting the the fertilizer, of the increased yield of crops produced by 100 lbs. of sphate when used alone, when used with muriate of potash, and when h both muriate of potash and nitrate of soda.

results are held to indicate that with the present condition of the fer- market the purchase of carriers of phosphorus such as acid phosphate, bone meal, and basic slag is alone justified.

dy in farm drainage, C. E. THORNE (*Mo. Bul. Ohio Sta., 3 (1918), No. 7, pp. 107-110*).—Fertilizer and manurial experiments with corn, soy beans, and clover grown in rotation on impoverished drained and undrained Clermont County, Ohio, are said to indicate that phosphorus, potassium, lime, and drainage are all required for profitable crop production on

these soils. With manure as the carrier of nitrogen and potassium [illegible] basis of cost of application only, the cost of the phosphorus and [illegible] nearly one-half that of the drainage has been recovered at values [illegible] prewar prices of fertilizers and crops, while at values based on [illegible] present prices the entire outlay was recovered, together with a [illegible] margin of profit.

The nitrogen problem and the work of the Nitrogen Products Co[illegible] (*Jour. Soc. Chem. Indus., 36 (1917), No. 22, pp. 1196–1200; Nature [Lo[illegible] 100 (1917), No. 2512, pp. 316–318; Metallurg. and Chem. Engin., 18 (191[illegible] 2, pp. 77–81*).—This is a preliminary report of the British committee [illegible] was organized in June, 1916, to consider the nitrogen problem especially [illegible] the standpoint of war needs and to outline plans for increasing the [illegible] of nitrogen compounds. It deals especially with plans which are under [illegible] sideration for increasing the recovery of by-product ammonia and for [illegible] cynamid and utilizing the ammonia oxidation and synthetic-ammonia [illegible] esses under Government aid and auspices.

The effect of different salts on ammonia formation in soil, G. P. [illegible] (*Jour. Biol. Chem., 31 (1917), No. 2, pp. 411–413; abs. in Jour. Che[illegible] [London], 112 (1917), No. 669, I, p. 632*).—Investigations at the New J[illegible] Experiment Stations are reported which show that "utilizing various combi[illegible] of $MgSO_4$, K_2SO_4, and $Ca(H_2PO_4)_2.2H_2O$, and controlling the concentration [illegible] two atmospheres, the following effects on ammonia formation from dried [illegible] in soil were obtained: (1) In combinations of the salts where $Ca(H_2PO_4)_2.2H_2O$ was present in only 0.1 of the total concentration a considerable increase [illegible] ammonia formation was apparent. (2) When 0.8, 0.9, or all of the total [illegible] centration was supplied by $Ca(H_2PO_4)_2.2H_2O$ the ammonia formation was [illegible] proximately 26 per cent greater than when no salts were added to the [illegible] (3) $MgSO_4$ and K_2SO_4 singly or in combination were toxic when [illegible] $Ca(H_2PO_4)_2.2H_2O$ was added in the combination."

Several references to literature bearing on the subject are given.

Nitrate of soda in 1917 (*Chem. Trade Jour., 62 (1918), No. 1601, pp. [illegible] 68*).—The nitrate situation during and at close of the year is briefly reviewed. It is stated that the production of Chilian nitrate was 2,949,300 tons in 1917 as compared with 2,865,300 tons in 1916. The shipments during 1917 to Europe (including Egypt) amounted to 1,048,000 tons, and to the United States and other countries 1,684,000 tons. It is estimated that the stocks in Chili December 31, 1917, amounted to 882,000 tons. The increased activity in production and export during the year is ascribed to the high price and great demand for munitions factories. The price of the nitrate was almost prohibitive of its use as fertilizer.

Bibliography on the extraction of potash from complex mineral silicates E. C. Buck (*Metallurg. and Chem. Engin., 18 (1918), Nos. 1, pp. 33–47; 2, pp. 90–95*).—This bibliography includes a full list of references to patents and periodical literature relating especially to the sintering of phosphatic rocks with feldspars, but also to other methods and processes applicable to feldspars, leucite, and glauconite (greensand marl).

A neglected chemical reaction and an available source of potash, E. J. Ashcroft (*Chem. Trade Jour., 61 (1917), No. 1596, pp. 529–531; Sci. Amer. Sup. 85 (1918), No. 2216, p. 390*).—This article, which is an abstract of a paper discussed at a meeting of the Institution of Mining and Metallurgy in London, calls attention to the fact first discovered by Bassett that, "if any common variety of orthoclase or microcline feldspar be dry crushed to 100 mesh in a steel iron mill and mixed with its own weight of pure dry common salt, and the

ated to from 900 to 1,000° C. for two hours out of contact with air or moisture or furnace gases carrying such air or moisture, . . . the sodium base of the salt displaces the potassium base of the feldspar strictly according to the equation:

$$2NaCl+K_2OAl_2O_3(SiO_2)_6=Na_2OAl_2O_3(SiO_2)_6+2KCl.$$

"If the temperature has not exceeded 1,000° C., and if moisture and air have been carefully excluded, the product will be found to consist of finely divided white sodium feldspar (albite) and a mixture of quite neutral and freely soluble sodium and potassium chlorids. These chlorids may be readily lixiviated in water, and are easily separated from each other by fractional crystallization. The extraction of potash obtainable by this means from a sample of feldspar carrying upward of 10 per cent K_2O will be in the neighborhood of 90 per cent under the conditions above stated. There is no loss by volatilization, and the weights of residue and salt will be found to correspond with the equation."

The practical application of this reaction in the preparation of potash salts from feldspar is discussed and experiments with the process are reported. An efficiency process suited to present conditions is described. The author holds that "all consideration of by-products in such schemes should be a secondary consideration and should not form an essential part of the scheme."

Sources of potash, T. E. Thorpe (*Nature [London], 100 (1918), No. 2514, pp. 346–347; Sci. Amer. Sup., 85 (1918), No. 2198, p. 193*).—This article deals especially with the Bassett-Ashcroft process of preparing potassium chlorid from feldspars (noted above), but also briefly describes the Stassfurt, Alsatian, Spanish, and Abyssinian deposits of potash salts. Attention is called to the fact that "conditions such as probably have produced the Stassfurt deposits are still at work and may be observed in several parts of the world operating over large areas, as, for example, in the Adji-Daria Bay, in the east of the Caspian Sea. . . . None of these areas has been investigated with such care as that of the North German plain, but the general conditions which have led to their production are seen to be similar, although local circumstances, especially the extent to which they were subjected to an intermittent influx of sea water, have modified the nature, relative amounts, and distribution of their various saline constituents."

Italian leucitic lavas as a source of potash, H. S. Washington (*Metallurg. & Chem. Engin., 18 (1918), No. 2, pp. 65–71*).—In this article "attention is called as a future possible source of potash, to the leucitic lavas of seven volcanoes along the west coast of Italy from Bolsena to Vesuvius. The rock types are characterized and the several volcanoes described succinctly. The names of the volcanoes, the tonnage of the lavas, the percentage of potash, and the total (minimum) amount of potash at each are calculated. It is shown that the leucitic lavas of these volcanoes, with an average potash content of about 9 per cent, contain at least 8,786,200,000 metric tons of K_2O, making them the greatest accumulation of highly potash-rich silicate rocks known. Methods of extraction of the potash are not discussed."

Recovery of potash from greensand, H. W. Charlton (*Jour. Indus. and Engin. Chem., 10 (1918), No. 1, pp. 6–8; Amer. Jour. Sci., 4. ser., 45 (1918), No. 266, p. 142*).—This deals with a process which was originally developed for the treatment of feldspar for the extraction of potash but which has been found to apply more advantageously to greensand or glauconite.

"The process consists in heating the finely ground mineral under pressure with water and lime in autoclaves. Steam at a pressure of about 225 lbs.

is fed directly into the digester and this is maintained for a period of [illegible] four hours. Although glauconite contains less potash than feldspar, it has been found that it is decomposed more readily than the latter, and thus yields potassium hydroxid that is nearly pure. It is proposed to utilize the waste material obtained by filtration from the potash solution for making bricks, tiles, and similar articles, as it has been found that when mixed with sand, pressed, and steam hardened it makes durable products."

Sources of potash, H. MAXWELL (*Nature [London], 100 (1918), No. 2510, p. 384*).—Discussing the value of bracken fern as a source of potash, analyses are reported which show that the sample of air-dried fern examined contained 4.82 per cent of ash, of which 41.5 per cent was potash; that is, the dried fern itself contained about 2 per cent of potash. The ash contained in addition small quantities of phosphoric acid.

Kelp industry in British Columbia (*Jour. Soc. Chem. Indus., 36 (1917), No. 13, p. 710; abs. in Chem. Abs., 11 (1917), No. 23, p. 3368*).—This is a brief note on the operations of a plant established at Sydney, B. C., in 1915, for the production of potash and algin. The plant is now utilizing from 30 to 40 tons of raw kelp daily in the manufacture of fertilizer, the product being a coarse dry, but heavy powder. It is believed that the manufacture of potash and iodin, without the production of by-products, would not prove profitable in normal times. It is estimated that the kelp beds on the coast of British Columbia contain sufficient material to supply not only the local requirements for potash but some for export.

The value of phosphates on Indiana soils, A. T. WIANCKO and S. C. JONES (*Indiana Sta. Bul. 210 (1918), pp. 16, figs. 4*).—Field tests with different phosphates conducted during the past 12 years on 5 experimental farms representing different soil types found in the State have led to the following conclusions:

Acid phosphate has given the best results, with basic slag and steamed bone meal next in order of profitableness. Rock phosphate gave good results in certain cases, but showed the least profit. In immediate returns on the first and second crops after application, acid phosphate has yielded crop increases of from 3 to 25 times as much as those obtained from rock phosphate. Neither acid nor any other phosphate used increased soil acidity or the need for liming, although Indiana soils needing phosphorus are deemed generally to be in need of lime also.

Based on the results obtained, recommendations for soil improvement are briefly outlined, and include a systematic rotation of crops, liming, drainage, manuring, and the application of from 150 to 200 lbs. per acre of acid phosphate or some other readily available phosphate to each grain crop in the rotation.

Indiana soils need phosphates, A. T. WIANCKO and S. C. JONES (*Indiana Sta. Circ. 79 (1918), pp. 8, figs. 3*).—This presents in a condensed and popular form the results of the work noted above.

The relative value of limestone of different degrees of fineness for soil improvement, J. W. WHITE (*Pennsylvania Sta. Bul. 149 (1917), pp. 3–24, figs. 11*).—This bulletin reports the results of both laboratory and greenhouse experiments to determine the relative value for soil improvement of high calcium and magnesium limestone ground to pass 100, 60, 20, and 8 mesh screens respectively, the finer material in each case being excluded, except from the 100-mesh grade, as compared with equivalent amounts of the burned products. The studies were made during the period 1915 to 1917, inclusive, and embrace observations upon the solubility of the different grades in pure and carbonated water; upon their relative value in correcting soil acidity and in the formation

...nitrates; upon the lime requirements of the soil at three periods of the ...periment; upon the rate of decomposition of the different grades of lime...stone; upon the alkali-soluble humus and total nitrogen recovered from soil ...treated with 100-mesh limestone as compared with burned lime treatment; ...upon the effect on the growth of red and crimson clover, wheat, oats, soy ...beans, hairy vetch, Canada field peas, sweet clover, Hungarian millet, and ...Grand Rapids lettuce. Soil from the ammonium sulphate plats of the general ...fertilizer experiment was used and showed a lime requirement at the beginning ...of the experiment of 3,220 lbs. of calcium carbonate per acre 7 in. The results ...are presented in tabular form and fully discussed.

The total increased yield of crops from the high calcium burned lime and ...limestone was 537.21 gm., as compared with 518.13 gm. for the magnesian lime ...and limestone, indicating very little difference in the value of the two limestones ...for crop production. The relative value of the different grades of limestone for ...soil improvement, represented in their percentage relation to the highest value ...as 100, were as follows:

Relative value of limestone particles.

Kind of factor.	100 mesh.	60 mesh.	20 mesh.	8 mesh.
...city in carbonated water	100	57	45	28
...in correcting acidity	100	57	27	18
...ation of nitrates	100	94	56	12
...th of plants	100	69	22	5

The burned lime and the 100-mesh limestone gave an alkaline soil the first year, with a slight acidity at the end of the third year. High calcium 60-mesh stone gave an alkaline soil the second year, and the 20-mesh at the end of the third year. The 60-mesh magnesian stone produced an alkaline soil after 3 years, while the 20-mesh showed a lime requirement of 1,288 lbs. for the same period. Applications of the 8-mesh grade showed lime requirements after 3 years of 3,017 lbs. for high calcium stone and 3,051 lbs. for magnesian stone.

The rate of decomposition of the limestone at the end of 3 years was ascertained by means of determinations of the total carbonates in the soil and was found to be as follows:

Decomposition of the limestone in 1915, 1916, and 1917.

Degree of fineness.	High calcium stone.		Magnesian stone.	
	Per cent.	Pounds per acre.	Per cent.	Pounds per acre.
...mesh	92.4	8,689	91.2	8,581
...mesh	81.5	7,671	72.2	6,790
...mesh	46.7	4,393	34.9	3,299
...mesh	14.9	1,307	5.97	562

The decomposition of the limestone in the soil as determined by the acidity corrected was found to bear a close relation to the residual limestone as determined by the increased carbon dioxid content.

"On the basis of the data accumulated on the behavior of the varied-sized limestone particles when incorporated in an acid soil, it may be concluded that an application of limestone in which the entire product consists of very fine

material is less desirable than one consisting of varied degrees of fineness. The increased cost of the very finely ground limestone, together with its rapidity with which it disappears from the soil as compared with coarser material, leads to the conclusion that an application of material all of which will pass a 10-mesh screen and include all of the fine material incident to such grinding is sufficiently fine for soil improvement if applied somewhat in excess of the immediate need of the soil. The crop to which limestone should be applied will depend upon the proportion of fine material. In a rotation of corn, oats, wheat, and grass, the limestone, if finely ground, should be applied to the wheat, while in the case of a coarser grade of limestone, the application should be made to the corn or oats, and this allows time for the coarser particles to come into play previous to the clover seeding."

The relative value of limestone of different degrees of fineness for soil improvement, J. W. WHITE and F. D. GARDNER (*Pennsylvania Sta. Bul. 152 (1918), pp. 16, figs. 7*).—This bulletin presents in a condensed and popular form the investigations noted above.

Gypsum as a fertilizer, O. NOLTE (*Jour. Landw., 65 (1917), pp. 67–73; abs. in Jour. Chem. Soc. [London], 112 (1917), No. 660, I, p. 624*).—The literature of this subject is discussed, and the following conclusions are drawn:

Gypsum acts on the soil by means of both of its constituents, double decomposition occurring with the mineral compounds of the soil. Owing to its ability to undergo hydrolytic decomposition into acid and base, it influences the reaction of the soil especially by virtue of the constituent with the predominating reaction, that is, the sulphuric acid. Consequently, as far as possible, gypsum should not be used with acid and physiologically acid fertilizers, and in particular should never be applied to acid soils. On the other hand, it acts favorably in conjunction with physiologically basic salts, as it removes or weakens the basic reaction resulting from plant growth, and so assists in the retention of a loose texture by the soil. Gypsum may be employed with advantage when there is a shortage of such physiologically active fertilizers as potassium sulphate and chlorid, superphosphate, and ammonium sulphate."

The sulphuric acid situation in the United States, L. B. SKINNER (*Metallurg. and Chem. Engin., 18 (1918), No. 2, pp. 82–85*).—The situation is quite fully reviewed, and the conclusion is reached that in the future "the general trend will be to relegate acid manufacture to those engaged in the metallurgical industry [and that] there will be a gradual decline in the practice of pyrites-burning, and incidentally brimstone, for the express purpose of making sulphuric acid."

Analyses of commercial fertilizers, fertilizer supplies, and home mixtures, C. S. CATHCART ET AL. (*New Jersey Stas. Bul. 314 (1917), pp. 4–51*).—This reports the actual and guarantied analyses of 228 brands of complete fertilizers, 234 brands containing nitrogen and phosphoric acid, 16 home mixtures, and 137 samples of fertilizing materials including nitrate of soda, sulphate of ammonia, dried blood, dried and ground fish, crude fish, fish and tankage, tankage, acid phosphate, and basic lime phosphate. A total of 635 analyses is reported.

AGRICULTURAL BOTANY.

Textbook of botany, C. E. ALLEN and E. M. GILBERT (*Boston: D. C. Heath & Co., 1917, pp. X+459, pls. 8, figs. 223*).—This book is planned to furnish a secondary school course in botany continuing throughout the school year, but suggestive courses are also outlined to start at different times and continue for shorter periods. Laboratory and field work is provided. Chapters or parts

these deal with bacteria, fungi, forestry and forest management, plant breeding, and plant diseases.

Note on a method of demonstrating the heat of respiration, M. C. POTTER (*Proc. Roy. Soc. [London], 91 (1917), No. 623–624, pp. 435–438, fig. 1*).—A method is described of demonstrating the heat of respiration, with modifications thereof for different purposes.

Relative transpiration as a measure of the intrinsic transpiring power of the plant, R. C. KNIGHT (*Ann. Bot. [London], 31 (1917), No. 123–124, pp. 351–360*).—Experimentation testing the comparative evaporation from atmometers and shoots of *Eupatorium adenophorum* is claimed to have shown that only when the wind velocity is constant does relative transpiration, using this term as it was first employed by Livingston (E. S. R., 18, p. 328), give a satisfactory measure of the intrinsic transpiring power of the plant.

The applicability of Weber's law to phototropic reaction by Phycomyces nitens, JOHANNA S. A. WISSE (*De geldigheid der wet van Weber voor de phototropische reactie van Phycomyces nitens. Proefschr., Univ. Groningen, 1916, pp. 67+3, pl. 1, figs. 2*).—The agreements and disagreements with Weber's law as noted in tests on the phototropism of *P. nitens* are indicated with discussion.

Studies in permeability.—V, The swelling of plant tissue in water and its relation to temperature and various dissolved substances, W. STILES and I. JØRGENSEN (*Ann. Bot. [London], 31 (1917), No. 121–123, pp. 415–434, figs. 5*).—Having continued the series of studies previously noted (E. S. R., 37, p. 632), the authors describe a method for investigating the passage of water between the vegetable cell and its surroundings. This method is quantitative, permitting investigation of the kinetics of the changes which occur. The probable error and means of reducing it are indicated.

Carrot roots and potato tubers absorb water for some days, after which equilibrium is maintained for a considerable time. Swelling is greater in case of the carrot. In both, the previous history of the tissue influences greatly the amount of absorption, which is also affected by different solutes and their concentration, by temperature, and by toxic action on the cells. The bearing of these and other facts presented on some theories of permeability is discussed.

Permeability of the cell walls of Allium, S. C. BROOKS (*Bot. Gaz., 64 (1917), No. 6, pp. 509–512*).—The author states that in the course of studies with onion bulb scales, employing a modification (which is described) of the method used in the work previously noted (E. S. R., 39, p. 26), he found that the exterior cell wall of the epidermis from the inner surface of onion bulb scales is slightly permeable to hydrochloric acid but practically impermeable to various salts, dyes, and sodium hydroxid. It is thought necessary to consider the influence of impermeable cell walls in interpreting data on the permeability of plant tissues.

Notes on osmotic experiments with marine algæ, R. H. TRUE (*Bot. Gaz., 65 (1918), No. 1, pp. 71–82*).—Notes are given on work, so far as completed, on osmotic pressure in cells of marine algæ.

Studies on osmotic values in Alpine plants, J. MEIER (*Mitt. Naturf. Gesell. Freiburg, 3 (1916), No. 3, pp. 101–167, fig. 1*).—The results are given in considerable detail of studies carried on in 1911 to 1913 at Fribourg, Switzerland, relating to the osmotic values of the saps in various portions of different plants in several environments under varied conditions of weather, season, and geological situation; or, more particularly, the relation between osmotic pressure and such factors as situation (exposure), habit of growth, wind, precipitation, sunshine, snow covering, and temperature.

The extraction of sap from plant tissues by pressure, R. A. GORTNER, J. LAWRENCE, and J. A. HARRIS (*Biochem. Bul., 5 (1916), No. 20–21, pp. 155–[illegible], pl. 1*).—The authors, applying the modifications employed by Gortner and Harris (E. S. R., 31, p. 221) of the methods of Dixon and Atkins, as previously reported (E. S. R., 29, p. 828), have been able to substantiate, except in minor points, the conclusions of these authors, showing that samples of sap pressed from unfrozen tissues can not be taken as typical of the original concentration of the juices in the tissues. They have been able also to extend somewhat the results reported by these authors.

The pentose sugars in plant metabolism, H. A. SPOEHR (*Plant World, 20 (1917), No. 12, pp. 365–379*).—In a report of results (which are tabulated with discussion) of investigations on the carbohydrate content of *Opuntia* spp. as related to age, season, and such conditions as water content and starvation (by being kept in the dark), the author states that the salient feature of these experiments is the observation that pentose sugars accumulate only under conditions of low water content, though but little light is thrown on their origin. The problem is regarded as very complex.

The course of carbohydrate consumption during starvation is considered to throw some light on the utilization of various sugars. The proportions of these to each other maintain a surprising regularity as depletion proceeds, hexose and pentose sugars being consumed at about the same relative rates.

Anthocyanins, W. C. DE GRAAFF (*Chem. Weekbl., 15 (1918), No. 5, pp. 132–140*).—This is a review of studies bearing upon the constitution, distribution, and significance of anthocyanins in plants.

Resin secretion in Balsamorrhiza sagittata, E. C. FAUST (*Bot. Gaz., 63 (1917), No. 6, pp. 441–479, pls. 4, figs. 2*).—Summarizing the principal facts developed during a study undertaken to determine the origin of the secretory tissue and the cause and significance of resin secretion in *B. sagittata*, the author states that inulin, a polysaccharid produced during photosynthesis, is broken down, giving as a by-product balsamoresene. This resene may be changed to resinic acid. Both these products are supposed to be toxic to the plant and to be translocated to schizogenously formed ducts where they are stored in the form of resinic acid.

The relation between acids and bases in vegetable tissues, G. ANDRÉ (*Bul. Soc. Chim. France, 4. ser., 31 (1917), No. 11, pp. 253–271*).—Data which are presented in tabular form, as obtained from a study of the percentages of such different substances as bases, acids, salts, and nitrogen present at different stages in the growth and maturity of *Hordeum vulgare*, *Linum usitatissimum*, *Camelina sativa*, *Carthamus tinctorius*, *Nigella damascena*, and *Spergula arvensis* showed an excess of nitrogen as compared with the amounts considered as accounted for in the intake of the plant.

Organic plant poisons.—I. Hydrocyanic acid, WINIFRED E. BRENCHLEY (*Ann. Bot. [London], 31 (1917), No. 123–124, pp. 447–456, figs. 3*).—Having extended the studies previously noted (E. S. R., 33, p. 327) to the effects of dilute hydrocyanic acid, the author reports that no trace of stimulation of either peas or barley was obtained with hydrocyanic acid or any of the compounds employed in the work previously reported. Prussic acid was very toxic to both these plants, giving effects which are described. Concentrations of 1:100,000 killed peas immediately or after a short period of poor growth. Barley subjected to 1:100,000 solution made a very slight growth after a period of arrest. This plant was killed by all strong concentrations. Formic acid was comparatively harmless to barley except in very strong concentrations, but sodium cyanid was as toxic as is prussic acid itself.

Poisoning tree parasites with cyanid of potassium. M. M. METCALF (*Science, n. ser., 47 (1918), No. 1214, pp. 344, 345*).—The author reports that in the spring of 1915 he bored half-inch holes in each of six apple and pear trees, filled the holes with powdered chemically pure potassium cyanid, and then plugged them up. Four of the trees were apparently dying from scale, and the other two were infested but not dying. During the summer all six trees became free from scale and the four dying ones began to recuperate. In the fall both the apple and the pear trees bore good fruit. After an interval of three years, all of the trees are reported as healthy and vigorous, with no areas of dead bark around the inoculation holes.

The above facts are believed to indicate that inoculation with potassium cyanid, if the chemical is used without admixture with other substances, is not necessarily injurious to apple and pear trees. The effectiveness of the treatment is said to be doubtful, however, as the scale died on other trees which were not inoculated.

Parasitism of seeds which are toxic or rich in essential oils. V. GALIPPE (*Compt. Rend. Acad. Sci. [Paris], 165 (1917), No. 14, pp. 432–436*).—The author has pointed out in a previous communication (E. S. R., 35, p. 244) the prevalence of parasites in seeds of a considerable number of plants, and has extended these studies to seeds of several plants which contain toxic substances or essential oils. He states that such seeds do not present an exception to the rule regarding the presence of parasites in seeds, which is suspected to hold throughout a wide range of plant forms.

The application of photochemical temperature coefficients to the velocity of carbon dioxid assimilation, W. H. BROWN and G. W. HEISE (*Philippine Jour. Sci., Sect. C, 12 (1917), No. 1, pp. 1–25, figs. 3*).—The results of the analysis of the work of various investigators are considered as remarkably consistent and as justifying the statement that carbon dioxid assimilation shows coefficients varying from 1 to 1.4 over long ranges of temperature favorable to the process. The coefficients are much smaller than those required by the van't Hoff law, being of the same order of magnitude as photochemical coefficients.

The relation between light intensity and carbon dioxid assimilation, W. H. BROWN and G. W. HEISE (*Philippine Jour. Sci., Sect. C, 12 (1917), No. 5, pp. 85–97, figs. 2*).—Continuing their study on the same plan as that above noted, the authors state that a review of the literature on photosynthesis does not lead to the conclusion which is commonly drawn therefrom, namely, that carbon dioxid assimilation by plants is proportional to light intensity, but that it really indicates a progressively smaller augmentation in the rate as intensity increases until the point is reached at which no measurable increase is produced by further increase in illumination.

The controlling influence of carbon dioxid.—IV, On the production of secondary dormancy in seeds of Brassica alba following treatment with carbon dioxid, and the relation of this phenomenon to the question of stimuli in growth processes, F. KIDD and C. WEST (*Ann. Bot. [London], 31 (1917), No. 123–124, pp. 457–487, pls. 2, fig. 5*).—The object of this work was to discover the controlling causes of the condition previously noted by Kidd (E. S. R., 35, 821) and designated by Crocker (E. S. R., 36, p. 330) as secondary dormancy consequent upon unusual accumulation of carbon dioxid in seeds, particularly those of *B. alba*, kept in high concentrations of that gas.

It is stated that secondary dormancy is due neither to increased mechanical restraint of the seed coats nor to decreased permeability of the coats to gases, but that it is due to a stable condition of the embryo tissue, which becomes readily established during the period of primary dormancy, induced by the

concentrated carbon dioxid. This condition is thought to be comparable to that of mature organs or of embryos maturing on the parent plant. A definite stimulus producing a change in the state of the tissue equilibrium is required for the initiation of growth after such inhibition. In case of dormant white mustard this may be brought about by various treatments, which, when carried too far, produce injury and may result fatally to the embryo.

Acacia seedlings. II. R. H. CAMBAGE (*Jour. and Proc. Roy. Soc. N. S. Wales, 50 (1916), pt. 1, pp. 143-164, pls. 4*).—In studies continuing those previously noted (E. S. R., 35, p. 329), a seed of *A. farnesiana* was soaked for 40 days in sea water and then planted. After 5 weeks it was examined, placed in boiling water, replanted, reexamined after 9 weeks, and placed in boiling water, again replanted, and after five weeks it finally sprouted. Another seed sprouted after having been left in the soil for 23 months. It is stated that the softening of the coatings requisite to sprouting is often accomplished in nature by fires. Otherwise the seeds may remain unaffected in the soil for years and may be transported by water for thousands of miles before germinating.

Abscission of flowers and fruits in the Solanaceæ, with special reference to Nicotiana. J. N. KENDALL (*Univ. Cal. Pubs. Bot., 5 (1918), No. 12, pp. 397-428, pls. 5, figs. 10*).—The author gives an account of studies regarding abscission in its various forms. He classes as direct factors bringing about abscission narcotic vapors, injury to floral organs, sudden rise in temperature, and lack of fertilization; and as indirect factors changes in soil conditions and factors evident in normal physiological development.

On the constancy of cell shape in leaves of varying shape. LILLIAN A. TENOPYR (*Bul. Torrey Bot. Club, 45 (1918), No. 2, pp. 51-76, fig. 1*).—The author describes a study of various plants which is said to confirm the conclusion reached by several authors named that the average cell size for any tissue of a species or variety is a fairly constant and hereditary character. The cell sizes of closely related species may be the same or may differ widely. The cell size in an organ may depend upon the stage of development of the plant at the time the organ is produced. Differences of leaf shape are not necessarily correlated with differences in cell shape. Leaf shape is due not to cell shape or differences therein, but probably to factors for periodically limiting the number and direction of the cell divisions in each type of leaf.

Œnothera lamarckiana considered as a nuclear chimera. J. P. LOTSY (*Arch. Néerland. Sci. Exact. et Nat., Ser. 3 B, 3 (1917), No. 2-3, pp. 324-359, pls. 6*).—The author claims that on account of heterozygotism *Œ. lamarckiana* and its derivatives do not constitute material suitable for use in proving the existence of mutations. The extension of studies regarding the existence of nuclear chimeras to other genera, the cytological examination of nuclear chimeras, and the further study of heterogamy are regarded as highly desirable.

Inventory of seeds and plants imported by the Office of Foreign Seed and Plant Introduction during the period from January 1 to March 31, 1915 (*U. S. Dept. Agr., Bur. Plant Indus. Inventory No. 42 (1918), pp. 129, pls. 9*).—This inventory (Nos. 39682 to 40388) includes considerable material collected by F. N. Meyer on an expedition which reached the capital of the Province of Kansu, China, as well as other introductions.

FIELD CROPS.

[Work with field crops on the Truckee-Carson reclamation project experiment farm in 1916]. F. B. HEADLEY (*U. S. Dept. Agr., Bur. Plant Indus. Work Truckee-Carson Expt. Farm, 1916, pp. 1-12, fig. 1*).—This reports the

...ress of work continued along the same general lines as previously noted (E. S. R., 36, p. 133), and includes a brief summary of weather conditions; a ...nature survey of the project; notes on agricultural conditions on the ...; the results of variety tests with barley, wheat, corn, and potatoes noted ...w; and the results of fertilizer experiments with wheat grown in green-...se beds, in which acid phosphate gave the best results, with barnyard ...ure next.

The leading barley varieties were Kents, with 1,916 lbs. per acre, and Coast, ... 1,765 lbs., and with average yields for 1915 and 1916 of 1,676 and 1,903 ... per acre, respectively. Little Club was again the highest yielding wheat ...ety, with 52.2 bu. per acre and a 2-year average yield of 48.9 bu. All varie-...s of corn failed to mature seed. A total yield of 41,405 lbs. of silage corn ... obtained from an area of 5.03 acres. Tests were made with 21 varieties ... potatoes, and American Wonder, Pearl, Hundredfold, Early Ohio, Rural ... Yorker No. 2, and Irish Cobbler were deemed best as regards uniformity ... shape and size. Scotch Rose from California and Russet Burbank grown ... a comparative test with Dietz selected Burbank produced about equally, ... Scotch Rose from Oregon germinated poorly.

Report of the Harney Branch Experiment Station, Burns, Oreg., 1913–14, ... R. BREITHAUPT (*Oregon Sta. Bien. Rpt. Harney Sta., 1913–14, pp. 2–22, figs. ...*).—This presents a brief history of the substation, with notes on the soil ... climate, and includes a report on experimental work conducted during ... period of 1912 to 1914, inclusive. The early work of the substation has ...ready been described (E. S. R., 32, p. 131).

Tabulated data are presented showing marked increases in yields of different ...ties of wheat, oats, barley, and potatoes grown on fallowed land in 1913 ... the yields from the same varieties grown on nonfallowed land in 1912. ...iety tests with winter and spring wheat, oats, barley, flax, field peas, and ...alfa grown during 1913, a favorable season, and 1914, a decidedly unfavor-...e season, are also noted. In crop rotation experiments, wheat after wheat ...e a 2-year average yield of 8.5 bu. per acre, after peas 14.5 bu., and after ...w, 15.66 bu. In 1913, peas after wheat produced 9.5 bu., and after fallow, ... bu. Winter wheat seeded at rates of 30, 45, 75, and 120 lbs. per acre during ...3 showed yields of 17.13, 14.5, 10.33, and 4.13 bu. per acre, respectively. ...date-of-seeding tests made in 1914, Swanneck barley seeded April 20, May ... and May 18 yielded 15.52, 11.04, and 6.63 bu. per acre, respectively; selected ...ssian wheat seeded April 18 and May 6 yielded 16.28 and 10.34 bu., re-...ctively; and University No. 25 flax seeded April 20, May 10, and May 18 ...ded 3.57, 5, and 1.78 bu. per acre, respectively.

Dry farming investigations at the Harney Branch Station, Burns, Oreg., ... R. BREITHAUPT (*Oregon Sta. Bul. 150 (1918), pp. 5–43, 46, figs. 16*).—This ...letin reports the results of experimental work conducted at the substation ...ing 1913 to 1917, inclusive, embracing variety tests with winter and spring ...eat, rye, oats, barley, emmer, winter spelt, and flax; field peas, alfalfa, ...eet clover, vetch, and other legumes; and with miscellaneous forage and ...l crops. Rotation, tillage, and date and rate of seeding tests with the prin-...al crops of the region are also reported.

The most successful crops included early-maturing, hardy, drought-resistant ...ieties of wheat, rye, oats, and barley. Winter wheat and rye, alfalfa for ...ay, flax, field peas, and potatoes are described as partly successful, while ... Sudan grass, millet, and all easily frosted, late-maturing, or nondrought-...sistant crops failed. A discussion of some of the results obtained at the ...bstation has already been noted (E. S. R., 37, p. 333), while information ...garding the history, climate, soil, etc., is included in the bulletin noted above.

The yields reported in this bulletin were produced with an average annual precipitation of 8.67 in. and with frost-free periods ranging from 49 to 64 days.

Of 37 varieties of winter wheat tested, the Turkey type has given the highest yields, the 5 leading strains with their respective 4-year average yields being C. I. No. 1538 with 20 bu. per acre, C. I. No. 2223 with 18.9 bu., C. I. No. 2224 with 17.6 bu., Crimean with 17.1 bu., and Kharkov with 16.2 bu. Planting Turkey winter wheat March 20 and April 5 resulted in yields of 12.5 bu. and 2.2 bu. per acre, as compared with 28.9 bu. for the same variety sown in the fall and 23 bu. for Early Baart seeded April 20. Low germination due to lack of moisture in the fall and late frosts in the spring has proved to be the principal limiting factor in winter wheat production.

Spring wheat is said to be the most consistent grain producer of any crop grown on the substation. Talimka, Chul, and Prelude have always matured by August 15, while Early Baart, the highest-yielding variety, with a 5-year average yield of 21 bu. per acre, has matured in 4 of the 5 years in which it was tested. Owing to its high-yielding powers and superior quality, this variety is deemed best for central Oregon. Seeding spring wheat at 20, 30 to 35, and 60 lb. rates resulted in net increases obtained after deducting twice the amount of seed used from the average yield of 17, 16.1, and 13.9 bu. per acre respectively. Early Baart and similar varieties yielded best when sown as near April 10 as possible.

Utah winter Barley, the highest yielding variety, produced only 6.4 bu. per acre for a 4-year average. Seeded in the spring this variety made fair yields but was quite inferior to the spring varieties. Hannchen, White Smyrna, and Coast with average yields of 26.3, 24.8, and 24 bu. per acre, respectively, are deemed the best spring barley varieties. Seeding rates of 24 to 30, 48 to 60, and 72 to 84 lbs. per acre showed average net increases of 20.8, 19.2, and 17.5 bu. per acre, respectively. The highest yields were obtained with seedings made about May 1.

Winter oats gave very low yields when seeded in the fall, and were inferior to spring oats when seeded in the spring. Rustless Selection, Silvermine, Kherson, Sixty Day, and Big Four (4-year average), with average yields of 34.2, 31, 30.7, 30.1, and 29.1 bu. per acre, respectively, were the most promising varieties. Seeding rates of 2, 4, and 6 pk. per acre have resulted in average net increases of 20.3, 19.9, and 19 bu. per acre, respectively. The middle of April is deemed the best time for seeding spring oats.

Winter rye appeared to be subject to the same limitations as winter wheat. Minnesota, the only variety to be tested each year of the 5-year period, produced an average yield of 8.9 bu. per acre, while, in 1917, Advance yielded 16.1 bu. Seeded early in the spring (March 20), winter rye yielded 14.8 bu., as compared with 17.5 bu. from a fall seeding of the same variety. Later seedings made April 5 and May 16 yielded 8.2 and 1 bu. per acre, respectively, as against 13.9 bu. from spring rye seeded May 16. The leading spring rye variety was S. P. I. No. 26101 with a 3-year average yield of 14.1 bu. per acre. Seeding about the middle of April at the rate of 45 lbs. per acre is deemed best.

The 4-year average yields of winter and spring emmer have been 15.6 and 15 bu. per acre, respectively. Tests with emmer have been discontinued. One variety of winter spelt was grown both as a fall and spring crop in 1915 and 1916, but the crop is not deemed suited to this region.

Primost flax, the only variety grown for 5 years, yielded 5.2 bu. per acre and Nova Rossick, grown for 3 years, 7.3 bu. Seedlings made about May 1 at a 10-lb. rate have given the best results.

The Grimm, Baltic, Cossack, and Semipalatinsk strains of alfalfa proved to be most hardy, although practically all of the kinds tested are said to have shown little winterkilling. Baltic and Martin Acclimatized produced 5-year average

...ds of 72 and 60.3 lbs. of seed per acre, respectively. Hay yields have averaged about 0.5 ton per acre. Spacing tests indicated that increased yields of ... hay and seed might be obtained by proper care in this direction.

Field peas have been rather unsatisfactory, Clamort, the leading variety, ...elding only 9.9 bu. per acre for a 4-year average. The average hay yield for ... varieties was about 0.9 ton per acre. Hogging off field peas resulted in an ...erage annual gain of 122 lbs. per acre for a 4-year period. In similar tests ... sheep, an average gain of 128 lbs. was made for 2 years.

White sweet clover yielded at the rate of 1.7 tons per acre for 3 years, and ...formed superior to the yellow-flowered sort.

Sesamum iberica, an oil seed plant, is said to be quite hardy, drought-resistant, and early. It yielded at the rate of 420 lbs. per acre.

In variety tests with potatoes, Netted Gem and Six Weeks (Geer) with average yields of 46.9 and 46.6 bu. per acre were highest. Of the root crops tested ... highest yield, 12.85 tons per acre, was obtained from Colossal Half-Sugar ...ngels.

The comparative yields and estimated acre values of leading varieties of the ...incipal crops grown at the substation are presented in tabular form. The ...alues ranged from $6.75 for Black Winter emmer to $18.90 for Early Baart ...pring wheat.

Rotation experiments, ranging from continuous cropping to 8-year rotations, ...re in progress, the crops used including winter and spring wheat, oats, barley, ...ye, flax, field peas, potatoes, sweet clover, and alfalfa. The results are deemed ...ewhat incomplete, but are held to indicate the necessity of bare fallow one ...ear in two for profitable grain production. The highest yield of spring wheat, ...3.9 bu. per acre, was obtained in a rotation with peas and fallow, while the ...allow-wheat rotation produced 14 bu. The increased yield was offset, however, ...y a higher cost of production and a low yield of peas. Wheat grown continuously produced 7.4 bu. per acre.

Tests of methods of seed-bed preparation for wheat on summer fallow are ...id to indicate the importance of early spring preparation, immediate harrowing of early-plowed land, the eradication of weeds on fallow, and early spring ...owing of stubble.

The so-called "slick spots" containing a slight excess of alkali and a deficiency of organic matter were somewhat improved by heavy applications of manure. Sweet clover also gave good results in reclaiming these areas. Alfalfa for seed, sown thinly and with a minimum of expense, has given fair returns.

[Summary report of State and cooperative experiment farms, 1915–16] (*Ann. Rpt. Bd. Farm Comrs. [Wyo.], 1915–16, pp. 3–99, pls. 19*).—A continuation of work previously noted (E. S. R., 36, p. 33), reporting the results of numerous field tests with flax and with grain and forage crops at several centers in Wyoming with and without irrigation.

Dry farming methods in Mysore, A. K. YEGNA NARAYAN AIYER (*Agr. Jour. India, 12 (1917), No. 3, pp. 325–335*).—Dry-farming methods practiced in Mysore are discussed in detail. The author states that 5,000,000 acres, or over 80 per cent of the total area under cultivation, are dry farmed.

[**Field crops work in India, 1915–16**], C. A. BARBER and W. R. DUNSTAN (*Ann. Rpt. Bd. Sci. Advice India, 1915–16. pp. 70–93, 189–191*).—Experimental work conducted at various centers in India with green manures, weeds in cultivated land, miscellaneous fodder crops, rice, wheat, juar, sugar cane, cotton, oil seeds, gram, tobacco, and indigo is briefly reviewed, a large part of the investigations having been already reported in detail.

[**Report on the field crops work of the department of agriculture, Bengal, 1916**] (*Ann. Rpts. Expert Off. Dept. Agr. Bengal, 1916, pp. 1–78*).—This re-

ports the results of fertilizers, variety, and cultural tests with rice, jute, sugar cane, peanuts, and potatoes, and of field tests with miscellaneous fodder crops.

Annual report of experimental [field crops] work of the Agricultural station, Landhi, 1915–16, T. F. MAIN (*Dept. Agr. Bombay, Ann. Rpt. Agr. Sta. Landhi, 1915–16, pp. 12, pls. 2*).—Rotation experiments with potatoes and cotton and field tests with berseem, alfalfa, and numerous minor crops are briefly noted.

Electroculture: With brief account of some experiments conducted at Lincluden Mains, Miss E. C. DUDGEON (*Trans. and Jour. Proc. Dumfriesshire and Galloway Nat. Hist. and Antiquarian Soc., 3. scr., 4 (1915–16), pp. 88–97*).—In continuation of work previously noted (E. S. R., 37, p. 336), the results obtained in field tests with potatoes and oats grown on electrified and unelectrified areas are briefly reviewed for 1912 to 1915, inclusive.

Barley seedlings, grown under control conditions in a greenhouse during the season of 1913–14, showed an excess of 41 per cent in dry weight for the electrified plants over the control plants.

Experiments with early vegetables to determine the effect of electric light upon plant growth are briefly noted and are said to indicate that germination was greatly accelerated, the seedlings showing such remarkable vigor that they could be set out in the open without the necessity of being hardened off.

The economic significance of the root development of agricultural crops, A. and G. L. C. HOWARD (*Agr. Jour. India, Indian Sci. Cong. No., 1917, pp. 17–28, pls. 2, figs. 5*).—The authors present experimental evidence based on observations of the root systems of flax, gram, wheat, *Hibiscus sabdariffa*, *H. cannabinus*, and Java indigo showing that soil aeration is responsible for a series of phenomena relating to crop production on the Indo-Gangetic alluvium.

A comparison of the root systems of different varieties of the same crop and of the various crops named showed a marked correlation between the root system and varietal characters, such as drought resistance, adaptability to high soil moistures during the monsoon period, etc., and to physical conditions of the soil.

On the study of the root system of cereal and forage plants, S. I. VORONIN (*Selsk. Khoz. i Lĕsov., 251 (1916), August, pp. 477–505; abs. in Internat. Inst. Agr. [Rome], Internat. Rev. Sci. and Pract. Agr., 8 (1917), No. 2, pp. 198–201*).—Experiments with roots are reported to determine the length, area of spread, depth of penetration, and maximum number of roots in kilograms per hectare. Special ditches were dug for daily observations of root growth and the results of the studies may be briefly summarized as follows:

The roots gradually decreased in volume as the plant increased in size. Root penetration was found to be dependent upon the soil type. Water absorption from the roots by the plant was most intensive at a level of 25 cm. (9.8 in.), less so at 50 cm., and disappeared entirely at 75 cm., the water content of the roots remaining constant. It was found that where the roots penetrated through certain well-defined layers of soil, as clay, black mold, or sand, it was necessary to estimate the absorption of water from the root by the soil as well as by the plant.

Investigations regarding the relationship between the length of roots and drought resistance are reported as indicating that the length of the roots themselves has little influence on the absorbent capacity of the root system, except for that portion abundantly covered with root hairs which develop freely in humid atmospheres.

Pasture and forage crops for south Mississippi, B. B. FERRIS (*Mississippi Sta. Bul. 180 (1917), pp. 32, figs. 7*).—This presents a rather comprehensive discussion of the present agricultural situation on the cut-over pine lands of

south Mississippi. The basis of successful farming in this region is said to be live-stock production, but the native grasses are regarded as inadequate, even with the extensive ranges available, and recommendations are made, therefore, relative to suitable grasses and legumes for pasture as indicated by experimental tests and field observations made at the McNeill substation over a period of years. Bermuda grass, carpet grass, and lespedeza have given the best results for summer pasture, while oats, rape, and bur, hop, and crimson clovers have proved best for winter and early spring. Climatic conditions are decidedly unfavorable for hay production, the use of the silo is deemed essential to success in live-stock feeding. Excellent crops of silage from corn and sorghum have been obtained. Velvet beans have proved to be a valuable forage crop for the small farm where a silo is impracticable. Soy beans are said to give much promise in this locality.

The grasses of Illinois, EDNA MOSHER (*Illinois Sta. Bul. 205 (1918), pp. 467–574, figs. 285*).—A monograph on the grasses of Illinois comprising an account of the structure of grasses, a key to the genera of Illinois grasses, and brief descriptions and notes on the distribution of the grasses found in the State. The author has listed 204 species representing 63 genera, 43 species being now recorded for the first time as occurring in Illinois.

A bibliography of 23 titles, including only those works in which the grasses of the State are mentioned, is appended.

[Fodder grasses of Nellore, India], C. TADULINGHAM and K. RANGA ACHARYA (*Madras Agr. Dept. Yearbook, 1917, pp. 35, 36, 49–52, pls. 8*).—The more important fodder grasses encountered in the Nellore District of the Madras Presidency, India, are described and illustrated.

In addition to the above, an undescribed species of Cynodon was noted which is said to be closely allied to *C. dactylon*. Observations revealed the fact that the grass previously identified as *Panicum crus-galli* was composed of two closely related species. Color variations in the flowers of *Pavonia procumbens* are also briefly noted.

Haymaking, H. B. MCCLUBE (*U. S. Dept. Agr., Farmers' Bul. 943 (1918), pp. 31, figs. 16*).—This presents a rather detailed discussion of approved methods for handling hay, with particular reference to the best utilization of labor by the adoption of modern haying implements such as loaders, push rakes, and stackers. Schemes are outlined for employing various sized crews and acreages when loading is done by hand or with a loader, when the hay is stacked with push rakes and stackers, and when the crop is baled in the field from the windrows. The nature of curing is briefly explained and the necessity for a systematic plan of haying operations emphasized.

Methods employed by successful hay growers are described and include the making of timothy and clover hay with a loader, and of irrigated alfalfa hay with push rakes and stackers, and the making and baling of prairie hay, and of alfalfa hay under unfavorable weather conditions.

[Cereal production in Chile], S. CUBILLOS VALDIVIESO (*An. Agron. [Santiago de Chile], 8 (1914), Nos. 2–3, pp. 149–272, pls. 4; 4, pr. 73–112*).—A detailed account of the production of wheat, barley, and oats in Chile.

Résumé of the fiber-inspection work of the Bureau of Agriculture during the year 1916, M. M. SALEEBY (*Philippine Agr. Rev. [English Ed.], 10 (1917), No. 1, pp. 64–88*).—The fiber-grading and inspection work in the enforcement of the fiber-grading and inspection law (E. S. R., 36, p. 634) is reported for 1916, with considerable tabulated data showing the production and exports of abacá and maguey in the Philippine Islands.

The total production of abacá in 1916 amounted to 1,174,663 bales, and of maguey (retted), 129,263 bales, as compared with a production of 1,011,366 and 79,940 bales, respectively, in 1915.

Inoculation of legumes, A. BONAZZI (*Mo. Bul. Ohio Sta., 3 (1918), No. 5, pp. 161, 162*).—A tabular statement is presented based on a compilation of data from various sources to show the results to be expected from cross-inoculation of 21 common cultivated or wild legumes.

Varieties of alfalfa seed, H. D. HUGHES (*Iowa Agr., 18 (1917), No. 4, pp. 163–165*).—Field tests with a number of samples of alfalfa seed from various sections of this country and Europe have been in progress at the Iowa Experiment Station since 1910.

Practically no difference has been noted in the yield of hay from Dakota, Nebraska-, and Kansas-grown seed, while Oklahoma-grown seed has not yielded quite so well as that produced farther north, and irrigated seed from Utah has been decidedly inferior. The imported seed has given very poor yields as compared with American-grown seed from any source. Nebraska- and Kansas-grown seed have proved to be practically as hardy as that from the Dakotas and Montana, although the latter has withstood severe winter tests somewhat better than the former, while Oklahoma and Utah seed has been almost entirely winterkilled. Imported alfalfa has been hardy, showing less winterkilling under ordinary conditions than common commercial seed from any part of the United States.

The source of seed apparently had much less to do with the hardiness than the particular strain or variety, although as a general rule northern-grown seed has been more hardy than southern-grown seed. Grimm alfalfa and related types, while not superior to the imported alfalfas in hardiness, are deemed superior to them for Iowa conditions because of their high-yielding qualities, the possibility of securing four cuttings per season, and their vigorous fall growth.

Botanical studies of some beer barleys [in Italy] conducted during the year 1915–16, U. BRIZI (*Ann. Ist. Agr. [Milan], 13 (1915–16), pp. 147–160*).—Tabulated data, showing the vegetative characters, yields, and malting value of 22 varieties and strains of barley, are presented and discussed. Similar data are presented for 5 varieties grown both as spring and winter barleys.

The chemical composition of some beer barleys produced in Italy, V. TRIVELLONI (*Ann. Ist. Agr. [Milan], 13 (1915–16), pp. 171–176*).—The chemical composition of 45 varieties or strains of barley is outlined in tabular form and briefly discussed.

On the proteid substances of barley in the grain itself and during the brewing processes.—IV. Investigations as to malting power of various sorts of barley, H. SCHJERNING and JENNY HEMPEL (*Compt. Rend. Lab. Carlsberg, 11 (1917), No. 6, pp. 333–378*).—In continuing work previously noted (E. S. R., 32, p. 23), the present investigations were undertaken to ascertain whether the variation in the malting power of different barleys could be regarded as an hereditary quality and, if so, to what extent it might be affected by soil conditions. The experimental work was conducted at the Svalöf experiment station during 1912, 1913, and 1914, employing Haunchen, Chevalier II, Swan Neck, Primus, Princess, and Golden barleys, and at Tystofte and Abed experiment stations during 1913 and 1914, using Tystofte Prentice, Svalöf Golden, Binder, Abed 570, Tystofte Cross, and Abed 110 barleys.

The nitrogenous substances formed the chief subject of study, as some of these materials which may appear during the malting and mashing of the barley are thought to impair the keeping qualities of the beer. The carbohydrate materials, on the other hand, do not occasion any difficulty. The quantity of wort extract was determined and is regarded as a measure of the amount of carbohydrates dissolved and should, according to the senior author,

...se 73 per cent of the dry matter in the malt. The quantity of acid in the ... the hydrogen ion concentration, and the intensity of the oxidation proc... of root formation were also studied. The courses of the different ... were traced through the steeped, ungerminated seed and through the ... wort produced from the malt. Detailed tabulated data are presented ...cussed. The results obtained are deemed inconclusive, but may be ... summarized as follows:

... barleys examined showed no typical racial peculiarities in regard to ... lower, and in no case was the relative velocity of the different metabolic ... of such a character as constantly to produce the disappearance of ... H after a suitable malting time. Golden barley, however, appeared ... particularly poor in proteolytic enzyms as compared with the other ..., the conversion of the insoluble proteins in the grain being relatively ... The conversion of insoluble carbohydrates measured by the formation ... extract showed no racial distinction, the formation of the extract being ... or less uniform for all varieties and attaining or exceeding the requisite ... per cent of dry malt-stuff. No typical varietal characteristics were observed ... respect to acid formation, loss by oxidation, or root growth.

Bean culture in California, G. W. HENDRY (*California Sta. Bul. 294 (1918), ...-349, pl. 1, figs. 13*).—The beans produced in California in 1917 are ... to have constituted 44 per cent of the entire crop of the United States, ... to have been grown on an area of approximately 558,000 acres located ...ly in southern California, in the Sacramento and San Joaquin Valleys, ... Stockton Delta, and the central coast region. The field practices and cul... methods employed in growing the crop are described. Notes are pre... on the agricultural history; the range in the State; the adaptations; ... utilization of the staple varieties of beans grown, including Lima, Pink, ... White, Blue Pod, Lady Washington, Blackeye, Cranberry, Bayo, Gar..., Red Mexican, Red Kidney, White Tepary, Horse, Henderson Bush Lima, ...ch White, and Spotted Red Mexican. Brief agronomic descriptions of the ...erent sorts are given in tabular form, together with information relative ... effect of the planting date on the blossoming and the life period of beans ...wn at Davis and Berkeley and on the amount of seed required to plant 1 ...

The total average cost per acre of growing and marketing beans in Cali...nia has been estimated to be $55.23 for dry farming, $52.68 for subirriga... and $60.88 for surface irrigation.

Tests of varieties of corn at Auburn, E. F. CAUTHEN (*Alabama Col. Sta. ... 209 (1918), pp. 27–36, figs. 16*).—This reports the results of tests with 54 ...eties of corn covering the period of 1900–1917, inclusive, in a continuation ... work previously noted (E. S. R., 17, p. 965). During this period the most ...ductive varieties grown for three years or more included Unimproved Station ...ow, Alexander Prolific, Whatley, Unimproved Henry Grady, Sanders, ...kley, Hastings Prolific, Mosby, and Marlboro. All varieties having 145 or ...e ears and nubbins per 100 plants have been classed as prolific, those having ... 126 to 144 as medium prolific, and those having 125 or less as nonprolific. ...ed on this classification these types have produced average yields of 34, 33.1, ... 31.6 bu. per acre, respectively. Mosby, Sanders, Hastings Prolific, Davis ... Land, Alexander Prolific, Whatley, Vardaman, and Hickory King, classed ...prolific, have given more than 85 per cent grain by weight, while local White, ...improved Henry Grady, Shaw, and Riley Favorite, all large-ear types, have ... less than 80 per cent. The very early and very late varieties are said to ...e produced lower yields than the intermediate varieties.

A simple method of selfing cotton, G. R. HILSON and F. R. PARNELL (*Madras Agr. Dept. Yearbook, 1917, pp. 54, 55*).—A method of selfing cotton is briefly described whereby the flower is prevented from opening by sewing up the bud either in the early morning of the day on which it would normally open or the previous evening. The needle is passed through the bud about three times at a point approximately ¼ in. from the tip, the thread pulled as tight as possible without cutting the petals, and the needle then passed several times through one of the bracts, leaving about 2 in. of loose thread between the bud and the bract. After setting, the corolla withers and falls off, and being suspended by the thread effectively labels the boll.

Length of staple of cotton produced in North Carolina, O. J. MCCONNEL (*N. C. Agr. Ext. Serv. Circ. 54 (1917), pp. 4, fig. 1*).—The percentages of the different lengths of staple of cotton grown in most of the counties of North Carolina are shown in tabular form.

Cotton culture in Algeria, TRABUT (*Gouvt. Gén. Algérie, Dir. Agr., Serv. Bot. Bul. 54 (1917), pp. 35, figs. 13; Bul. Agr. Algérie, Tunisie, Maroc, 23 (1917), Nos. 4, pp. 65–77; 5, pp. 89–94; 6, pp. 113–129, figs. 13*).—The field practices employed in cotton production in Algeria are discussed, the more common cotton varieties and selections described, and the disease and insect enemies of the crop briefly noted.

Flax in Egypt (Linum usitatissimum), W. CARTWRIGHT (*Agr. Jour. Egypt, 6 (1916), pp. 1–8*).—A brief account of flax production in Egypt and of the preparation of the fiber for the textile trade.

Investigations on hops, IX, X, J. SCHMIDT (*Compt. Rend. Lab. Carlsberg, 11 (1917), No. 6, pp. 314–329, pl. 1; 330–332; abs. in Nature [London], 99 (1917), No. 2495, p. 510*).—Two papers are given.

IX. *The occurrence of the wild hop in Denmark.*—In continuation of work previously noted (E. S. R., 33, p. 530), the author summarizes information obtained through numerous inquiries regarding the wild hop and presents a colored chart showing the relative distribution of the plant in Denmark and northern Slesvig. It is stated that the wild hop is of little value for brewing purposes, due to its low rosin content, although an examination of plants from north Sealand revealed a bitter rosin content of approximately 14 per cent.

The author is uncertain as to whether the plant existed in Denmark prior to human habitation, as it has not been found in prehistoric deposits in that country. The plant is regarded as a troublesome weed, especially by the forest officials.

X. *On the aroma in plants raised by crossing.*—In continuing work previously noted (E. S. R., 33, p. 530), the author secured hybrid plants from a cross between an American male plant of a strain possessing the so-called American aroma (Cluster ♂ 7 a) and a female plant of European origin (Hallertauer spät 27). The hops of the hybrid exhibited the typical American aroma. He concludes that despite the fact that the quality of aroma is entirely lacking in the male plant it can be transmitted nevertheless to the offspring through the male parent in which it is genotypically present.

The Indian species of Iseilema, R. S. HOLE (*Agr. Jour. India, Indian Sci. Cong. No., 1917, pp. 125–131*).—Two species of Iseilema, said to be the most valuable forest fodder grass in the Indian peninsula, are briefly described and are identified as *I. laxum*, a perennial, and *I. anthephoroides*, an annual, the former being deemed much superior to the latter.

The inheritance of the weak awn in certain Avena crosses, H. H. LOVE and A. C. FRASER (*Amer. Nat., 51 (1917), No. 608, pp. 481–498, figs. 2*).—This paper is a preliminary report of studies of factor differences between certain

...s of awns, and forms a basis for further studies of the relation between ... and other characters of the oat grain. The material used included the ...awned type represented by the Burt variety and a strain of Red Texas, ... awnless type represented by Sixty-Day, and the strong-awned type repre... by a strain of *A. fatua*. The parent plants and F_1 progeny were grown ... greenhouse, and the F_2 and F_3 individuals in the field. The studies were ...ted at Cornell University in cooperation with the Office of Cereal In... ...ations, U. S. Department of Agriculture.

The F_1 progeny of Burt×Sixty-Day were almost all awnless, while the F_2 ...iduals showed all degrees of awning, from the perfectly awnless type to ... which were 100 per cent awned like the Burt parent. A study of the F_3 ...ony was made to determine the number of factors concerned in the above ..., and from the data presented it was concluded that the awnless type was ...t completely dominant in the first generation; that the second generation ...e awnless, partially awned, and fully awned plants in a ratio approximating ...:1; that the fully awned plants behaved as pure recessives, breeding true in ...cases in the second generation; that all of the partially awned F_2 plants ...re heterozygous, giving approximately 3 plants not fully awned to one fully ...ned plant in the third generation; that awnless plants of the F_2 generation ...prised both homozygous plants of the parental type and heterozygous inter...diates which later behaved as the partially awned F_2 plants; and that some ...wless F_2 plants might be expected to be heterozygous since awnless plants ...e commonly found in the first generation.

The authors suggest that the difference between the weak-awned and the ...less varieties of the oats studied might be explained by the assumption of ...fference in one pair of genetic factors, or that the presence of an inhibitory ...tor accounts for the partial dominance of the Sixty-Day over the weak-...ned Burt. The data at hand seem to point to the presence of a factor in...cing awning in Sixty-Day which appears to be linked with a factor for yel... color, while certain other crosses of the Burt variety show that it contains ...factor for yellow color which does not inhibit awning. Unpublished data ...e said to show a very definite linkage of an inhibitory factor with a factor ...yellow color in a cross between *A. fatua* and Sixty-Day.

Results of crosses between the strong awned and awnless types agreed ...ely with those obtained between weak awned and awnless types.

Additional studies were made on the presence of basal hairs and the type of ...culation of the lower kernel of the spikelet. A marked correlation was ob...ed between the fully awned condition and the presence of medium long ...d hairs, such as exist on the Burt grains, and also between the fully awned ...ition and the Burt type of articulation. When all the spikelets were awn...s the union of the lower kernel and its rachilla was usually of the *A. sativa* ...e, and the basal hairs were either short or lacking.

It was also noted that, in the crosses between weak awned and awnless types, ...ever the panicle had two awns on a spikelet all of the spikelets on the ...icle were awned. The irregular occurrence of these two awned spikelets ...d the wide variability in numbers on a panicle are held to indicate that there ...no definite factor for the two-awned condition. The authors consider it more ...ely that the occurrence of such spikelets is due to environmental influences ...on the factor for complete awning.

Note on copper sulphate as a stimulant for the rice crop, W. H. HARRISON ...d P. A. SUBRAHMANYA AYYAR (*Madras Agr. Dept. Yearbook, 1917, pp. 55–62, ...1*).—A series of three pot experiments are reported showing marked in...eases in the yields of rice from applications of small amounts of copper sul...ate in the irrigation water. Increased yields of grain for manured pots

varied from 9.1 to 17.7 per cent and of straw and chaff from 10.1 to [illegible] cent over the untreated checks. The increases for the unmanured plots ran[illegible] from 19.7 to 36 per cent in yield of grain and from −5.8 to +24.1 per cent [illegible] yield of chaff and straw.

A mill for the quantitative husking of paddy in small lots, F. R. Pa[illegible] (*Madras Agr. Dept. Yearbook, 1917, pp. 52–54, fig. 1*).—A small wooden [illegible] for husking rice in small quantities in variety tests is described and illustra[illegible] It is claimed that the apparatus gives very little broken rice, even with varie[illegible] that normally break badly.

Effect of temperature and other meteorological factors on the growth [illegible] sorghums, H. N. Vinall and H. R. Reed (*Jour. Agr. Research [U. S.] [illegible] (1918), No. 2, pp. 133–147, pls. 2*).—This article records data obtained by [illegible] Bureau of Plant Industry of the U. S. Department of Agriculture in obse[illegible] tions on the growth of selected varieties of sorghum under widely vary[illegible] climatic conditions at Puyallup, Wash.; Chico, Berkeley, Chula Vista, E[illegible] and Pasadena, Cal.; and Chillicothe, Tex.

Summarizing these results as well as the observations of other investig[illegible] the authors conclude that "sorghum is semitropical in its adaptations and [illegible] not thrive in regions of low temperatures. Sunshine is probably an important factor of growth; witness the difference of growth at Chula Vista, Cal., a[illegible] Puyallup, Wash., where the mean temperatures and the total positive heat u[illegible] available are but little different. The 'physiological constant' for the ripen[illegible] phase of sorghums according to Linsser's law of growth is about 0.53. E[illegible] tremely high temperatures during the period of flowering and fruiting resu[illegible] in a decreased yield of seed. The date of planting should be so arranged th[illegible] germination and early growth of the plants will take place during the per[illegible] of high temperatures and the flowering and fruiting when more moderate te[illegible] peratures prevail. Adverse weather conditions affect such supposedly st[illegible] characters as the number of leaves per plant, as well as the volume of growth."

A list of references to literature cited is given.

Sweet sorghums for forage, E. A. Madson (*California Sta. Bul. 293 (1918), pp. 271–283, figs. 2*).—The value of sweet sorghum for forage in California is discussed, and cultural and harvesting methods are described. Limited va[illegible] riety tests are said to indicate that for a second crop following grain, grain hay, or some other spring crop, Early Amber and Red Amber were desirable while for sections with relatively long growing seasons Honey was very promising.

The yield and nitrogen content of soy beans as influenced by lime, J. G. Lipman and A. W. Blair (*Soil Sci., 4 (1917), No. 1, pp. 71–77*).—In continuation in 1916 of work previously noted (E. S. R., 34, p. 632; 36, p. 232), the earlier results were confirmed. It was further demonstrated that the effect of lime upon the yield and percentage of nitrogen in the shelled beans of soy beans grown on limed and unlimed plats may extend to the top part of the plant when harvested as forage or as dry stalks and to the roots and the accompanying nodules.

A count of the nodules on the roots of plants from limed and unlimed plats showed an average of 83.6 nodules per plant for 6 varieties (Cloud, Hollybrook, Manchu, Medium Yellow, Ohio 9035, and Swan) grown on limed plats, and 3 nodules per plant for the same varieties grown on unlimed plats.

An average yield of 13.2 bu. per acre of shelled beans was secured on the unlimed plats as compared with an average yield of 19.3 bu. on the corresponding limed plats. The average nitrogen content of the beans was 5.73 and 6.3 per cent, respectively.

plants harvested for forage showed an average nitrogen content in the tops of ... per cent on limed plats and 2.67 per cent on unlimed plats, and in the ... 1.47 per cent and 1.24 per cent.

When harvested at maturity the average yield of stalks on the unlimed ... amounted to 1,342 lbs. per acre and on the limed plats, 2,041 lbs. per ... The average nitrogen content was 0.615 and 0.791 per cent, respectively. The average total yield of nitrogen recovered in the soy-bean crop from ... unlimed plats was estimated to be 53.52 lbs. per acre, and from the cor... limed plats 87.67 lbs. per acre. Based upon the amount of nitrogen ... in nonleguminous crops grown on nearby plats having similar soil ... and without the aid of commercial fertilizers or green manures, it ... believed that as much as 65 lbs. of this nitrogen was derived from the air.

Soy beans.—A crop worth growing, R. A. MOORE and E. J. DELWICHE (*Wisconsin Sta. Bul. 289 (1918), pp. 16, figs. 3*).—This presents a popular account of the production and use of the soy bean in Wisconsin.

Report on the beet sugar industry in the United States (*Fed. Trade Com., Rpt. on Beet Sugar Indus., U. S., 1909–10–1913–14, pp. XII+164*).—This report ... chiefly with the cost and profits of growing sugar beets, the cost of ... manufacturing and marketing beet sugar, the profits in the manufacture and ... of beet sugar, and the relations between sugar beet growers and beet sugar ... manufacturers. The operations of all the beet sugar factories in the United States, except two small ones, are covered in detail during the 5-year period ... with the business year of 1913–14.

A study of the arrowing (flowering) in the sugar cane with special reference to selfing and crossing operations, T. S. VENKATARAMAN (*Agr. Jour. India (1917), Indian Sci. Cong. No., pp. 97–108, pls. 6*).—Flowering in the ... canes grown at the Coimbatore (India) Sugar Cane Breeding Station is ... and methods employed in selfing and crossing are described.

The following are deemed significant factors in arrowing of sugar cane: ... graphical position, rainfall, interference with the vegetative growth, time ... planting and soil conditions, and group or class peculiarities. Observations ... field tests are reported to show the relative importance of these factors, ... a study of the time and sequence of arrowing. Attempts to induce the ... canes of southern India to arrow simultaneously with the thin canes of ... India have so far met with little success.

Seedling cane, C. W. HINES (*Philippine Agr. Rev. [English Ed.], 10 (1917), ... 1, pp. 32–42, pls. 5, fig. 1*).—The propagation of sugar cane by means of ... is discussed, with a brief historical outline of the practice. Experimental work with seedling cane at the Singalong Experiment Station was begun in 1915 in an effort to establish new varieties and strains better suited to ... conditions than those now grown. The methods employed in the hybridization work are described.

... y of the sucrose variations in successive cane joints as they attain ... the ... with special reference to the death of the leaves, T. S. VENKATA... and K. KRISHNAMURTI ROW (*Agr. Jour. India, 1917, Indian Sci. ... pp. 117–124, pls. 5; abs. in Internat. Inst. Agr. [Rome], Internat. ... and Pract. Agr., 8 (1917), No. 9, p. 1254*).—A method is described for ... the sucrose value of sugar cane seedlings at an early stage of ... Methods ... means of an analysis of such portions of the cane as bear dead ... present ... fication of their maturity. Considerable tabulated data are pre..., due to co... ing analyses of numerous seedlings by this method, known as ... analysis, with the usual analyses made after the cane has at... The results are also compared graphically.

It was concluded that in very immature cane the highest sucrose content occurred in the lowest section, and as the cane advanced in maturity the region of high sucrose content gradually moved upward. Different canes of the same variety, analyzed on different dates, varied only slightly in maximum sucrose content. Canes remaining in the ground after attaining full maturity showed rapid deterioration at the basal joints. The maximum sucrose reading obtained by sectional analyses of any particular variety probably represents the maximum sucrose content of the variety under given conditions and has been designated as the "sucrose index" of the cane. This index is fairly constant for each variety or seedling and renders possible a comparison between different seedlings even when immature.

Trifolium alexandrinum [berseem], A. CARRANTE (*Il Trifoglio alessandrino. Florence: Ist. Agr. Colon. Ital., 1916, pp. 114, pls. 19*).—This is a detailed discussion on the production of *T. alexandrinum* in Italy.

The properties of Colorado wheat, W. P. HEADDEN (*Colorado Sta. Bul. [1918], pp. 3–31*).—The author presents in a somewhat popular form a summarized discussion of the results obtained in investigations already noted (E. S. R., 33, p. 41; 37, p. 38) dealing with the influence of various factors, including soil fertility, irrigation, and climatic conditions, on the quality of Colorado wheat.

Cleaned, treated, and tested seed for Colorado, W. W. ROBBINS, H. E. VASEY, and G. E. EGGINTON (*Colorado Sta. Bul. 238 (1918), pp. 3–40, figs. 11*).—This bulletin embraces detailed discussions of the need of clean, pure, viable seed, of home methods of seed testing, including purity and germination tests, of methods of seed treatment for disease prevention in beans, cabbage, celery, wheat, oats, barley, corn, millet, flax, rye, timothy, and tomatoes; and of the Colorado pure seed law.

The rag-doll seed tester, G. J. BUET, H. H. BIGGAR, and C. E. TROUT (*U. S. Dept. Agr., Farmers' Bul. 948 (1918), pp. 7, figs. 6*).—This describes a convenient inexpensive, and satisfactory method of testing seed corn for viability.

Seed Reporter (*U. S. Dept. Agr., Seed Rptr., 1 (1918), No. 8, pp. 1*).—Tabulated statistics are presented and discussed on the production of vegetable seeds by seedsmen, on the acreage grown by seedsmen or under their supervision, and on growers' prices quoted to dealers on advance growers' contracts in the United States from data in the war emergency seed survey of January 31, 1918, and are compared with similar data for 1916 and 1917.

A further brief summary of the seed corn situation is given for Michigan, Ohio, Indiana, Illinois, Wisconsin, Minnesota, North and South Dakota, Iowa, Nebraska, Kansas, Missouri, and Kentucky.

The resolutions adopted and recommendations made by the advisory committee of agricultural and live stock producers pertaining to the seed activities of this Department and to the need of increased production and conservation of certain seed crops are presented.

Statistical information is given on the stocks and prices of buckwheat seed and on the stocks, quality, demand, and prices of seeds of late-sown crops, including alfalfa, sweet clover, rape, millet, and broom corn. The tabulated plans as to imports of forage plant seed are included.

Seed report, 1916, J. W. KELLOGG (*Penn. Dept. Agr. Bul. 293*, [Hollybrook, pp. 25]).—This reports the results of the analysis of 323 official samples and special samples of seed during 1916.

Proceedings of the Association of Official Seed Analysts of North America, 1915 (*Proc. Assoc. Off. Seed Anal. No. Amer., 1915, pp.* [correspondence, pp. 5–73 and 6–15

following papers were presented: Nonuniformity in Seed Testing Methods, by W. L. Oswald; Variations Observed in Purity and Germination Tests, by C. P. Smith; Variations in Germination and Purity Tests, by O. A. Stevens; Germination of Hulled and Unhulled Timothy Seeds as They Occurred in Samples Received at the Seed Laboratory, by W. L. Goss; Results Obtained by Testing Crimson Clover Seed for Germination in Soil in the Greenhouse and Between the Folds of Moist Blotting Paper, by W. L. Goss; Germination of Hulled and Unhulled Sweet Clover Seed, by W. L. Goss; A Comparison of the Weight Method and Count Method Used in Determining the Actual Value of Orchard Grass Seed, by W. L. Goss; The Development of Analytical Methods in European Seed Laboratories, by A. L. Stone; Imported Low Grade Crimson Clover and Orchard Grass Seed, by E. Brown; Types of Seed Imported as Rape, by E. Brown and F. H. Hillman; A Study of Oat Impurities in Iowa, by L. H. Pammel and Charlotte M. King; and Miscellaneous Notes and Problems Pertaining to Seed Testing, by G. T. French.

The report of the legislative committee includes an outline of the principles proposed for a uniform State seed law.

Buried weed seeds, WINIFRED E. BRENCHLEY (*Jour. Bd. Agr. [London], 24 (1917), No. 3, pp. 299–306; abs. in Country Life [London], 43 (1918), No. 1109, pp. 335, 336*).—Experiments at Rothamsted covering a period of 18 months are reported to ascertain what weed seeds capable of germination occur at different depths in soils of arable fields, old pastures, and pastures of varying ages. A sampling tube 6 by 6 by 9 in. was driven into the ground flush with the surface and the soil carefully removed inch by inch, placed in paper bags, and labeled, and other samples taken to a depth of 12 in. The soils were later removed to sterilized pans or boxes, placed in a greenhouse, and kept moist. As soon as seedlings appeared and were identified they were removed. Three or four samples were taken from each field. The results are reported in tabular form and discussed separately for each field entering into the experiment. Owing to the location of the fields it was thought that very little contamination occurred due to wind-borne weed seeds. The author's conclusions may be briefly summarized as follows:

If very old pastures (300 years or more) be plowed it is improbable that arable weeds will occur to any extent the first year. Groundsel, sow thistle, and dock may be carried by the wind, and other arable weeds introduced with the crop seed, etc., resulting in a few years in a typical arable weed flora.

On more recent pasture lands (30 or 40 years old) the seeds of certain weeds appeared to lie dormant in the soil for long periods and to germinate when the land was broken and conditions of growth became favorable. Most weed seeds in the top few inches of soil tended to germinate even though the land was grassed over and were stifled by the grass and clover. Weed seeds at a depth of from 5 to 9 in., unable to germinate, retained their vigor for varying lengths of time, depending upon the species. There were relatively few seeds in the lowest 3 in.

Land under ordinary tillage contained a large number of arable weed seeds capable of germination, especially in the top 7 in. of soil. These seeds do not necessarily germinate the year after seeding, but may lie dormant and germinate among later crops.

Methods of cultivation and manuring greatly influenced the number of weed seeds present in the soil, root crops proving to be a valuable aid in cleaning the land, due to constant hoeing and the prevention of weeds from seeding.

HORTICULTURE.

Practical gardening. H. FINDLAY (*New York and London: D. Appl[illegible] Co., 1918, pp. [XII]+388, pls. 16, figs. 25*).—A practical treatise on hom[illegible] dening discussing the fundamental principles involved in growing the [illegible] common vegetables and fruits. In addition to the production of fresh vege[illegible] for the spring and summer months, consideration is given to the growing storing of vegetables and fruits to be used during the nonproducing [illegible] The treatise concludes with a discussion of community gardens and a mon[illegible] working calendar.

Orchard and garden. B. W. DOUGLASS (*Indianapolis, Ind.: The Federal Pu[illegible] lishing Co., 1918, pp. [18]+369, pl. 1, figs. 170*).—A guide book for beginn[illegible] in fruit and vegetable growing for the market and for home supply, [illegible] greenhouse management. Consideration is given to the back yard garden [illegible] the home storage of fruits and vegetables, and several chapters deal with [illegible] mental gardening.

Garden steps. E. COBB (*Boston: Silver, Burdett & Co., [1917], pp. XI+22[illegible] figs. 96*).—A small manual for the amateur in vegetable gardening.

War gardens. M. FREE (*New York and London: Harper & Bros., 191[illegible] 114*).—A pocket guide for home vegetable growers.

The back yard garden. E. I. FARRINGTON (*Chicago: Laird & Lee, Inc., [illegible] pp. 191, figs. 12*).—A handbook for the amateur, the community, and the sch[illegible]

Home gardens. W. E. LOMMEL (*Indiana Sta. Circ. 80 (1918), pp. 24, fig[illegible] 10*).—A popular article on home gardening, including planting directions [illegible] maintaining a continuous supply of vegetables in gardens 25 by 50 ft. and 50 by 100 ft. in size, respectively.

Vegetable gardening. S. B. GREEN (*St. Paul, Minn.: Webb Publishing Co. 1915, 14. ed., pp. 335, figs. 137*).—The present edition of this book on vegeta[illegible] gardening for northern latitudes (E. S. R., 17, p. 463) has been revised [illegible] L. Cady to include new cultural practice, machinery, varieties of plants, and methods of controlling plant diseases.

Analyses of materials sold as insecticides and fungicides for 1917. C. S. CATHCART and R. L. WILLIS (*New Jersey Stas. Bul. 315 (1917), pp. 4-10*).—A report on samples of Paris green, lead arsenate, lime-sulphur, Bordeaux and miscellaneous brands inspected and analyzed during 1917.

More care is needed in handling western cantaloups. G. L. FISCHER and A. E. NELSON (*U. S. Dept. Agr., Bur. Markets Doc. 9 (1918), pp. 11, figs. 4*).—This document contains suggestions on the picking and handling of cantaloups for long distance shipment, based upon handling and market investigations conducted in 1916 and 1917, the important data on which are here presented.

Briefly summarized the investigation shows that too premature picking, rough handling in harvesting and preparation for shipment, failure to refrigerate soon after picking, and wrapping the cantaloups have all contributed to serious waste and decay on the market. The cantaloups should be picked just before they reach full maturity, or will slip from the vines readily, in order to prevent overripeness at the market. Wrapping the cantaloups prevents the escape of condensed moisture upon removal from refrigeration, and thereby promotes decay.

Variety tests of tomatoes. F. B. HEADLEY (*U. S. Dept. Agr., Bur. Plant Indus., Work Truckee-Carson Expt. Farm, 1916, pp. 12, 13*).—The results of a comparative test of 20 tomato varieties on the Truckee-Carson project in 1916 are presented in tabular form.

...nection with the test a plat protected with a few inches of wheat ...produced heavily until October 7, while in an unprotected plat the vines ...killed by the first freeze on September 11.

...matoes for the canning factory, S. N. GREEN (*Mo. Bul. Ohio Sta., 3 ..., No. 4, pp. 121–124, figs. 2*).—A discussion of the requirements for a can... ...ato, together with data relative to season and yield of varieties tested ...station for three years, and suggestions on selecting and saving seed.

...t of fruits recommended by the district horticultural societies (*Trans. ...t. Soc., n. ser., 51 (1917), pp. 25–28*).—Lists are given of orchard and ... fruits recommended for planting in northern, central, and southern ...

...me improvement experiments, L. R. BREITHAUPT (*Oregon Sta. Bul. 150 ..., pp. 43–47, fig. 1*).—Acclimatization tests of fruits conducted at the ...r substation at Burns for a number of years have shown that the season ...short for blackberries, dewberries, raspberries, loganberries, strawberries, ...apes. With a little irrigation, currants and gooseberries may be grown ...some success.

...e results with orchard fruits are presented in tabular form. The red ...ian crab apple, the Surprise plum, the Kaga hybrid plum, and the Com... cherry have shown distinct hardiness. These together with others of the ...st crab apples and a few of the hardiest and best apples, such as Yellow ...parent and Duchess, are recommended for the home orchard where some ...ation can be given.

...es are given on similar tests of shade trees and shrubs. Of the flowering ..., the common yellow rose, purple lilac, the red and white Tartarian ...eckles, Siberian pea tree, a Chinese barberry, and a Chinese flowering ... are most promising. The Russian olive, laurel-leafed willow, and Rus... poplar have proved to be the hardiest and best trees.

...e abuse of water on fruit and trees, D. F. FISHER (*Proc. Wash. State ... Assoc., 14 (1918), pp. 19–27*).—A discussion of insufficient and excessive ...ation as a means of promoting disease and injury to fruit trees and fruit. ...ief summary of experiments conducted by the U. S. Department of Agri... to determine the relation between soil moisture and apple bitter pit ...S. R., 38, p. 753) is included.

...e effect of nutrition upon flower formation in fruit trees, MÜLLER-... (*Landw. Jahrb. Schweiz, 31 (1917), No. 5, pp. 438–441*).—In pot ...ments here reported a greatly increased number of fruit buds was de... during the summer on two dwarf varieties of apples as the result of ...zing with ammonium sulphate in the spring of 1915. Although a severe ...orm prevented the securing of accurate fruiting records in 1916, observa... for one variety, the Bismarck, showed a marked superiority in quantity ...weight of fruit as a result of the application of nitrogen. The experi... is to be continued to determine the nature of changes in bud develop... brought about by the application of nitrogen.

Thinning out v. heading back as methods of pruning, V. R. GARDNER (*... Wash. State Hort. Assoc., 14 (1918), pp. 57–64*).—A paper on this sub... based primarily on the results of pruning investigations at the Oregon ...riment Station.

Notes on a graft hybrid, L. RODWAY (*Papers and Proc. Roy. Soc. Tasmania, ... pp. 108, 109, pl. 1, fig. 1*).—The graft hybrid here described and illus... is an apple picked from a Rome Beauty tree which had been grafted ... Senator stock. One side of the fruit resembles Rome Beauty and the other ...e Senator. Since this was the only apple of its kind on the tree, the author

suggests that it may have been developed from a migrating nucleus released from the stock when the grafting wound was made and which finally reached the growing point after the tree came into bearing.

Fertilizing apple orchards, F. H. BALLOU (*Mo. Bul. Ohio Sta., 3 (1918), No. 4, pp. 125–127*).—A popular summary of the more important results secured in cooperative orcharding experiments in southeastern Ohio (E. S. R., 36, p. 40).

A continuation of some of these experiments has confirmed previous conclusions relative to the beneficial effect of nitrate of soda on neglected orchards and the value of acid phosphate in encouraging the growth of clover for mulching purposes. The grass-mulch system of culture continues to give somewhat better yields than the annual tillage with cover crop system with the same fertilization at an average annual reduced cost of $14.43 per acre. Without the use of fertilizers in either case the tillage and cover crops plots have given a four-year average gain of 44 bbls. per acre over the grass-mulch section.

Spray calendar for apples and quinces (*New Jersey Stas. Circ. 93 (1918), pp. 4, figs. 3*).—A revision of Circular 75 (E. S. R., 37, p. 744).

Spray calendar for the peach (*New Jersey Stas. Circ. 94 (1918), pp. 4, figs. 3*).—A revision of Circular 79 (E. S. R., 37, p. 744).

Small fruits for home and market, W. J. GREEN (*Mo. Bul. Ohio Sta., 3 (1918), No. 4, pp. 113–120, figs. 3*).—Practical directions are given for starting and caring for strawberries, raspberries, and blackberries, including lists of varieties recommended for planting.

Inheritance of sex in the grape, W. D. VALLEAU (*Amer. Nat., 50 (1916), No. 597, pp. 554–564*).—A short review of the literature on sex inheritance in certain plants and animals, together with a discussion of the sexual condition in the grape, a proposed hypothesis of the gametic condition of plants bearing the various flower types and their inheritance, and a theoretical consideration of the origin of the cultivated hermaphrodites.

Extending the limits of grape culture by means of certain hybrids, L. DANIEL and H. TEULIÉ (*Compt. Rend. Acad. Sci. [Paris], 166 (1918), No. 7, pp. 297–299*).—The authors note the favorable results, both as to quality of product and resistance to phylloxera, obtained from the culture of certain sexual-asexual grape hybrids bred by Baco (E. S. R., 29, p. 148), and suggest the value of these graft hybrids in extending the limits of grape culture in Brittany.

The actual condition of hybrid bearers, E. PÉE-LABY (*Vie Agr. et Rurale, 8 (1918), No. 13, pp. 219–221*).—Notes are given on the condition of hybrid bearing grapes as observed by the Committee of Investigation of the Central Society of Agriculture in the Department of Haute-Garonne during 1917.

The hybrid direct bearers in Drome in 1917, A. DESMOULINS and V. VILLARD (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 39 (1918), Nos. 19, pp. 439–444; 20, pp. 468–473; 22, pp. 512–516*).—In continuation of previous data (E. S. R., 36, p. 641) observations are given for the eighteenth year relative to the behavior of hybrid direct-bearing grapes in the valley of the Rhone. The present report deals especially with grapes grown in the Department of Drome.

Girdling the Corinth grape to make it bear, G. C. HUSMANN (*Jour. Heredity, 9 (1918), No. 5, pp. 201–210, figs. 7*).—This paper is essentially the same as one noted from another source (E. S. R., 38, p. 346).

The Ohanez grape (*Cal. Bd. Vit. Comrs. Bul. 11 (1918), pp. 19, figs. 10*).—The Ohanez variety of Almeria table grape, which possesses excellent keeping qualities, has been widely distributed for trial in California. This bulletin

...gs a translation of an account by F. Richter of the Ohanez[1] as grown in ... it also contains notes by F. T. Bioletti on the Ohanez grape in Cali... including a description of the cordon system of pruning and training ... is specially adapted to the Ohanez vine.

Biological and morphological investigations on the olive and on its varieties cultivated in France. J. Rumy (*Ann. Sci. Nat. Bot., 9. ser., 20 (1917), No. 1-6, pp. 1-288, figs. 86*).—Part 1 of this work comprises a general botanical ... of the olive, including the germination and early development of the tree ... morphological, physiological, and chemical studies of the tree and fruit. ...rt 2 deals with variations among olives, with special reference to different ...itions of environment and culture. The varieties of olives cultivated in ...ce are then classified with reference to variations in the character of leaf, ..., and stone. Part 3 comprises a monograph on French varieties of olives.

Structure of wood in blueberry and huckleberry, Esther M. Flint (*Bot. ..., 65 (1918), No. 6, pp. 556-559, pls. 2*).—An examination of the anatomy ...Vaccinium and allied genera as compared with that of the wood of Quercus.

Annual report of the California Avocado Association for the year 1917 (*... Cal. Avocado Assoc., 1917, pp. 138, pls. 8, figs. 20*).—In addition to ...ine reports of the meetings held in Los Angeles in May, 1917, and in River... October, 1917, a number of papers dealing with avocado varieties, culture, ...d resistance, heat injury, composition and nutritive value, and utility are ...pled. A paper not read at the meetings entitled Exploring Guatamala for ...rable New Avocados, by W. Popenoe (pp. 104–138) is also included.

Third report on cacao selection in Djati Roenggo, E. E. L. MacGillavry and C. J. J. Van Hall (*Meded. Proefstat. Midden-Java, No. 30 (1917), pp. 9*).—A further progress report on selection studies with cacao trees (E. S. R., 32, ...).

Budding and grafting of citrus trees, R. A. Davis (*Union So. Africa Dept. Agr. Local Ser. No. 7 (1917), pp. 15, pl. 1, figs. 9*).—Directions are given for ...dding and grafting young trees in the nursery and top-working older trees, ...h special reference to conditions in South Africa.

Notes on California and Arizona grapefruit, E. M. Chace and C. G. ...rich (*Cal. Citrogr., 3 (1918), No. 9, pp. 200, 201, fig. 1*).—The authors here ...esent data derived from a comparative study of the physical and chemical ...aracter of the standard type Marsh Seedless grapefruit and of other types ...this variety.

The data show that fruits that are pear-shaped and coarse in appearance ...e a low specific gravity, a high percentage of rind and fiber, and a low ...rcentage of juice. These fruits often have a high percentage of seeds and ...rly in their growth develop hollow centers. The richness of juice compares ...orably with the smooth, thin skinned, and slightly flattened standard type.

Analyses were made from time to time of grapefruit picked and stored for ...eral weeks as compared with fruit left on the tree. The results indicate ...at after storage the fruit changes but little in ratio of sugar to acid, while ...e fruit left on the tree continues to mature and become sweeter. With fruit ...ked at the proper stage of maturity there is no apparent advantage in storing ...ore shipment.

Renewing old lemon trees, J. D. Culbertson (*Cal. Citrogr., 3 (1918), No. ..., pp. 202, 203, figs. 6*).—This comprises some data and observations relating ...old lemon trees that have had a heavy pruning.

Why navel oranges are seedless, A. D. Shamel (*Cal. Citrogr., 3 (1918), No. ..., p. 204, figs. 2*).—A popular discussion of this subject in which the author

[1] Traité Général de Viticulture.—Ampélographie, P. Viala and V. Vermorel (Paris: Masson & Co., 1903, vol. 4, pp. 356–360, pl. 1).

cites experimental work tending to show that seedlessness in the navel or... is entirely due to absence of pollen in the flowers.

Satsuma orange, R. E. BLACKBURN (*Ga. State Col. Agr. Circ. 76 (1...), pp. 4*).—Methods of propagating and growing Satsuma oranges are disc...

Investigations dealing with the coconut palm, P. C. VAN DER WOLK (*... tura, 39 (1918), Nos. 353, pp. 29–33; 354, pp. 41–61, pls. 2*).—The results o... author's investigations on the flower biology of the coconut, conducted at ... Buitenzorg Botanic Station during a period of about two years, are ... reported.

Third report on selection tests of Robusta coffee in Banaran, C. V... and C. J. J. VAN HALL (*Meded. Proefstat. Midden-Java, No. 31 (1917), ... pls. 2*).—In continuation of previous reports (E. S. R., 32, p. 236) d... given showing the character and yield of the progeny of Robusta coffee ... resulting from breeding and selection experiments in Java.

Tea culture in various countries (*Dept. Landb., Nijv. en Handel [Dutch East Indies]. Meded. Proefstat. Thee, No. 57 (1917), pp. 46, pl. 1*).—The fo... lowing articles on tea and its culture are included under the above gene... heading: The Tea Plant and Tea Culture in French Indo-China, by C. P. ... Stuart (pp. 3–17); The Culture and Preparation of Tea in the United States of America, by C. Bernard (pp. 22–30); Tea in British New Guinea, by ... Bernard (pp. 31, 32); and Tea in Natal, by J. J. B. Deuss (pp. 33–35). A résumé in French of the above articles is given by C. Bernard (pp. 37–40).

The American rose annual, edited by J. H. MCFARLAND (*Harrisburg, Pa.: Amer. Rose Soc., 1918, pp. 188, pls. 9, figs. 13*).—As in previous editions (E. S. R., 37, p. 145) the annual for 1918 contains articles by various authorities on rose propagation, breeding, culture, species and varieties, testing gardens, diseases, rose shows, roses in England and France, miscellaneous notes on roses, and a report on the work of the American Rose Society. The partial list of roses introduced in America is revised and considerable prominence is given to new varieties.

Purple bud sport on pale-flowered lilac (Syringa persica), FRIEDA CORE and H. H. BARTLETT (*Bot. Gaz., 65 (1918), No. 6, pp. 560–562, fig. 1*).—An illustrated description is given of a deep purple bud sport that developed on a pale-flowered lilac after the bush had been flowering for 10 years or more.

Magnolias for northern lawns, W. E. BONTRAGER (*Mo. Bul. Ohio Sta., 3 (1918), No. 5, pp. 159, 160*).—A popular discussion of magnolia species suitable for home planting in the North, including suggestions for protecting magnolias from severe winter weather and early spring frosts.

The useful viburnums or snowballs, W. E. BONTRAGER (*Mo. Bul. Ohio Sta., 3 (1918), No. 4, pp. 135, 136*).—Notes on the use of viburnums for planting on the lawn, including suggestions on species suitable for Ohio conditions.

Some new plants at home and abroad, N. E. HANSEN (*Minn. Hort., 46 (1918), No. 6, pp. 229–235, fig. 1*).—Brief notes are given on several ornamentals observed in Siberia, some of which are already being grown in this country.

Flowers: Production, commerce, customs regulations, G. VAGLIASINDI (*Comitato Naz. Tariffe Dog. e Trattati Com., Sez. 3, Monograph 4 (1917), pp. 108*).—An account of cut-flower growing in Italy, past and present, commercial trade in cut flowers with other European countries, and customs regulations of European countries relating to shipments of cut flowers.

Autumn in the flower garden, D. LUMSDEN (*Cornell Reading Course for Farm, No. 138 (1917), pp. 73–108, figs. 14*).—A popular treatise on flower gardening with special reference to the planting of hardy perennials. Descriptive lists are given of herbaceous perennials for the home flower garden, classified

...ding to color of bloom, together with lists of desirable plants for different ... and soils.

Garden guide.—**The amateur gardeners' handbook**, edited by J. H. DICK ... A. T. DE LA MARE (*New York: A. T. De La Mare Co., Inc., 1918. 3. ed., ... enl., pp. 336, figs. 290*).—The present edition of this work (E. S. R., ... 145) has been revised and enlarged.

Home grounds: **Their planning and planting**, L. H. BAILEY (*Harrisburg, ... J. Horace McFarland Co., 1918, pp. II+48, pls. 2, figs. 44*).—A popular ... ment of the subject, including a number of planting plans comprising ... areas, ranging in size from the city lot to the farmstead.

Rockeries.—**How to make and plant them**, H. H. THOMAS and S. ARNOTT ... don *and New York: Cassell & Co., Ltd., 1917, pp. VIII+142, figs. 109*).—... popular treatise on the subject.

The Bradley bibliography.—**V, Index of authors and titles; subject index**, ... RANDER (*Cambridge, Mass.: Riverside Press, 1918, vol. 5, pp. XXXII+ ...*).—This volume of the bibliography on woody plants (E. S. R., 31, p. 435) ... completes the work contains the index of authors and titles enumerated ... preceding volumes and in the additions and corrections to the preceding ... which appear in this volume. It also contains the subject index to all ... volumes.

FORESTRY.

Report of the subcommittee on forestry, F. D. ACLAND ET AL. (*Min. Reconstr. [Gt. Brit.], Reconstr. Com., Forestry Subcom., Final Rpt., 1918, pp. ... fig. 1*).—This comprises the final report of the Subcommittee on Forestry ... the Reconstruction Committee, which was instructed "to consider and report ... the best means of conserving and developing the woodland and forestry ... resources of the United Kingdom, having regard to the experience gained dur... the war."

Part 1 discusses the position of forestry in the United Kingdom, national ... requirements in timber and prospects of supply, experience gained as a result ... the war, and the case for adopting an adequate forest policy for the United ... Kingdom. Part 2 considers the forest policy which should be adopted to meet ... serious timber situation brought out in part 1. The question is considered ... reference to the area of forest needed, available forest areas and their ... distribution, methods of securing afforestation and replanting, forestry in rela... to employment and food supplies, the promotion of silviculture, the devel... of the forest industry, the forest authority and its functions, the ... financial aspect of afforestation, and estimate of the sum required to finance ... operations of the forest authority for the first 10 years. Reservations of ... Members of the committee, L. C. Bromley and Lord Lovat, are included, ... a number of memoranda and notes dealing with the report are appended.

Tropical forests and the war, H. N. WHITFORD (*Jour. Forestry, 16 (1918), ... 5, pp. 507–522*).—This paper gives a brief inventory of the timber supply ... various tropical countries and discusses the role that tropical timbers are ... to play in the readjustment of the world's demand for timber. A bib... graphy of consulted literature is appended.

Progress report of forest administration in the Punjab for the forest year 1916–17, R. MCINTOSH (*Rpt. Forest Admin. Punjab, 1916–17, pp. [12]+22+ ..., pl. 1*).—The usual report relative to the administration of the State ... ests of the Punjab (E. S. R., 37, p. 146).

Roadside trees in North Carolina, J. S. HOLMES (*N. C. Geol. and Econ. Survey, Press Bul. 162 (1918), pp. 8*).—An address on this subject discussing ... preservation and planting of roadside trees and the legal status of roadside

trees in North Carolina and in some other States, and suggesting new legislation on the subject.

Canadian Douglas fir: Its mechanical and physical properties, R. W. SIDDNS (*Dept. Int. Canada, Forestry Branch Bul. 60 (1918), pp. 84, figs. 30*).—This bulletin presents the results of small clear specimen, mechanical and physical, tests on Douglas fir conducted at the Forest Products Laboratory of Canada. The methods followed in making the various tests are described in detail.

French fir management in the Vosges, T. S. WOOLSEY, JR. (*Jour. Forestry, 16 (1918) No. 5, pp. 535–549*).—A translation of an important French paper on this subject[1] with the view of presenting ideas to the American profession which may be followed in the United States.

Preliminary volume tables for larch (*Jour. Bd. Agr. [London], 24 (1918), No. 12, pp. 1430–1435, fig. 1*).—The volume tables here given are based on measurements of larch trees felled in connection with the statistics which the British Board of Agriculture are collecting as to the rate of growth of timber under different conditions.

Method of working bamboos, E. MARSDEN (*Indian Forester, 44 (1918), No. 4, pp. 147–165*).—Tabular data are given showing the results of various systems of working bamboos, as observed on experimental plats that were laid out by R. S. Troup in 1910 and have been examined in detail annually for the last eight years.

Production of guayule rubber, H. C. PEARSON (*U. S. Dept. Com., Com. Rpts., No. 149 (1918), pp. 1172–1184*).—An account of the guayule rubber shrub (*Parthenium argentatum*) with reference to its botany, distribution and supply, regrowth in wild areas, cultural experiments, extraction processes, yields, prices, etc.

Investigations with wood conducted at the forestry experiment station, H. BEEKMAN (*Boschbouwk. Tijdschr. Tectona, 11 (1918), No. 1–2, pp. 1–82, pl. 1, figs. 10*).—An account of investigations conducted with the woods of Netherlands East Indies. The work deals with the identification of the woods by external characteristics and anatomic structure, their mechanical and physical properties, chemical composition, durability, and preservation. The results of mechanical tests are appended in tabular form.

The yield of volunteer second growth as affected by improvement cutting and early weeding, R. T. FISHER (*Jour. Forestry, 16 (1918), No. 5, pp. 493–506, figs. 3*).—This paper presents the results of certain experiments, computations, and silvicultural experiences bearing on the practical possibility of increasing the final value of volunteer second growth forests by early weeding or improvement cuttings. The data were gathered in northern Worcester County, Mass.

The spacing of trees, E. GIRARD (*Bul. Écon. Indo-Chine, n. ser., 21 (1918), No. 129, pp. 218–241*).—This comprises data and observations on the relative merits of various planting distances with reference to Hevea rubber trees when planted in a pure stand and also with reference to the planting of coffee in stands of Hevea rubber trees and of coconut palms.

Growth of trees, with a note on interference bands formed by rays at small angles, A. MALLOCK (*Proc. Roy. Soc. [London], Ser. B, 90 (1918), No. B 627, pp. 186–199, figs. 11*).—The author made some trial growth measurements of living trees by using an apparatus previously designed for observing the extension of cracks in buildings. The apparatus is illustrated and described and measure-

[1] Le Traitement des Sapinières Basé sur la Notion d'Espacement des Tiges. A. Gana (Paris, 1902).

cent records for several trees are given. The records are taken by reading variations in the position of interference bands which are formed by rays making small angles with the reflecting surface. The theory of interference bands is discussed.

The absolute form quotient, H. CLAUGHTON-WALLIN (*Jour. Forestry, 16 (1918), No. 5, pp. 523–534*).—A review of investigations on the stem forms of Norway spruce and Scotch pine, conducted by T. Jonson, and which have led to the construction and adoption for use by the Swedish Forest Service of volume taper and growth per cent tables for these species.

Taxation of woodlots, K. W. WOODWARD (*N. H. Col. Ext. Circ. 39 (1918) pp. 15*).—This comprises a summary of investigations conducted by the Forest Service of the U. S. Department of Agriculture, the State Forestry Commission, and other agencies relative to the effect of taxes on New Hampshire woodlots. The experience of other States is briefly reviewed and a bibliography on forest taxation, prepared by Helen F. Stockbridge, is appended.

DISEASES OF PLANTS.

Bacteriology in plant pathology, F. L. STEVENS (*Trans. Amer. Micros. Soc., 36 (1917), No. 1, pp. 5–12*).—The purpose of this paper is to direct attention to the place and importance of bacteriology in the field of plant pathology and to summarize the progress made therein since the establishment of the science. The subject is considered in both its broader general aspects and its more special relations.

Studies in the physiology of parasitism.—IV, On the distribution of cytase in cultures of Botrytis cinerea, W. BROWN (*Ann. Bot. [London], 31 (1917), No. 123–124, pp. 489–498*).—This work, though purely of enzymological interest, is said to have been introduced into the present series (E. S. R., 37, p. 47) on account of the light it may throw on the nature of extracts employed by previous investigators, and also on account of its bearing on the mode of secretion of enzyms by fungi and upon the technique of extraction, rules for which are given with general discussion of the factors involved and results obtained.

It is stated that dense sowings of spores gave a much stronger enzym extract than was obtained from thin sowings, the outstanding difference between the two cases being apparently that in the former a greater proportion of the hyphal mass is in a state of vigorous growth or has recently passed through such a state. Apparently the growing region of the hypha is the source of the enzym, the older portions not contributing an appreciable amount, but possibly reducing the amount actually produced by adsorption. Further facts are cited in support of the view that enzym production is confined to the growing apex of the hypha.

Two types of enzymic preparations are derivable from cultures of *B. cinerea*, namely, watery extract of the ground mycelium, and the fluid in which germination and growth have taken place. It is further stated that the amount of enzym and the amount of the enzym-retarding substances present under such varied experimental conditions as density of culture, age of same, or nature of mycelium were determined in each case. Discussion is given of the process of enzym extraction by fungi and of the bearing of these facts on the technique of enzym extraction.

Methods for the differentiation of pathogenic fungi in the tissues of the host, C. S. RIDGWAY (*Phytopathology, 7 (1917), No. 5, pp. 389–391*).—The author describes two methods of staining which he has used to locate and trace

the mycelium of pathogenic fungi in sections of tissue of the host plant. B[illegible] these methods have been found effective in connection with Botrytis and R[illegible] zopus in strawberry fruits, *Pythium debaryanum* in potato tubers, Fusarium in tobacco stems, the aecial stage of crown rust of oats in leaves of *Rhamnus cathartica*, etc.

Alternaria on Datura and potato, R. D. RANDS (*Phytopathology*, 7 (1917), *No. 5, pp. 327–338, figs. 4*).—A detailed account is given of the results of an extended investigation of species of Alternaria which occur parasitically on potato and other solanaceous plants, some of the data having already been published (E. S. R., 38, p. 451).

It is claimed that the fungus which causes the early blight of potato differs from that which produces the leaf spot and pod blight on the jimson weed and allied species of Datura. The latter species of Alternaria is said to be *A. crassan* n. comb., a technical description of which is given.

Arthropods and gasteropods as carriers of Cronartium ribicola in greenhouses, G. F. GRAVATT and R. P. MARSHALL (*Phytopathology*, 7 (*1917*), *No. 5, pp. 368–373*).—Studies were made with ants, sow bugs, snails, cockroaches, etc., to determine their ability to carry spores of *C. ribicola* to various species of Ribes and to white pine.

The small animals tested were found to be bearers of numerous uredinial spores and sporidia of *C. ribicola*, the urediniospores and sporidia adhering to the bodies of the animals under certain conditions for at least a week. The excreta of small animals fed on the different spore stages of the blister rust fungus showed abundant urediniospores and in some cases sporidia and pieces of telial columns. Alimentation was found to lessen the viability of the spores.

Some diseases of economic plants in Porto Rico, L. E. MILES (*Phytopathology*, 7 (*1917*), *No. 5, pp. 345–351, figs. 3*).—In notes on parasitic diseases on a number of economic plants, the author reports *Mycosphærella persea* on the avocado, *Cercospora carbonacea* on the yam (*Dioscorea* sp.), and *Helminthosporium mayaguezense* on *Paspalum conjugatum*. Technical descriptions of these new species are to be published elsewhere.

Cereal smuts and the disinfection of seed grain, H. B. HUMPHREY and A. A. POTTER (*U. S. Dept. Agr., Farmers' Bul. 939 (1918), pp. 28, figs. 16*).—Descriptions are given of the smuts of corn, wheat, rye, barley, oats, sorghum, and millet, together with methods of disinfection.

For the loose smuts, particularly those of barley and wheat, treatment with hot water has been found the only efficient method of control. For other smuts, treatment with formaldehyde or copper sulphate, either by soaking or sprinkling, has given favorable results. After treatment with copper sulphate, the seed grain should be limed if injury to germination is to be avoided. As the disinfecting treatments may injure germination, it is recommended that the seed be tested for germination and the rate of seeding determined from the results of the test.

The spray method of applying concentrated formaldehyde solution in the control of oat smut, R. J. HASKELL (*Phytopathology*, 7 (*1917*), *No. 5, pp. 381–383*).—A description is given of a method of applying formaldehyde for the prevention of oat smut, which consists essentially of spraying the seed as it is being shoveled from one pile to another with a solution of 1 part 40 per cent formaldehyde to 1 part water, the solution being used at the rate of 1 qt. to 50 bu. seed. The seed should then be covered with blankets, canvas, or sacks for about five hours, after which it may be uncovered and planted.

The chief advantage of this method, which has been very successfully used, lies in the fact that the seed is not wet and thus does not swell nor cause

...e by sticking in the drill. The operation is simpler than that of sprinkling and the treatment is effective and noninjurious to the seed.

Bean rust and spot diseases, P. J. SCHENK (*Tijdschr. Plantenziekten, 23 (1917), No. 5, Sup., pp. 25-34*).—These notes refer to observations on bean diseases variously named, as related to *Uromyces appendiculatus* and *Glaeosporium (Colletotrichum) lindemuthianum*.

Relation of temperature to the growth and infecting power of Fusarium lini, W. H. TISDALE (*Phytopathology, 7 (1917), No. 5, pp. 356-360, pl. 1, fig. 1*).—A report was given in a previous publication of studies on the nature and importance of resistance in flax to the wilt disease caused by *F. lini* (E. S. R., 36, p. 430). In the present paper, the author gives a discussion of the relation of temperature to the growth and infecting power of the parasite.

The critical temperature for the infection of flax by *F. lini* is said to be about 15° C. Flax is said to thrive well at temperatures as low as 13°. There appears to be a close correlation between the temperatures at which *F. lini* grows best in pure culture and those at which flax wilt is most destructive.

Control of lettuce rot, E. LEVIN (*Phytopathology, 7 (1917), No. 5, pp. 392, 393*).—The author calls attention to the control of soft rot of lettuce due to *Sclerotinia viridilividuum* obtained by spraying diseased plants with formaldehyde at the rate of 1 pint to 30 gal. water. This method of treatment was tested in fields with very excellent results in 1916 and again in 1917. It is pointed out that this treatment differs from the ordinary protective spray in that it seems actually to check the disease already in progress.

Soil fungi in relation to diseases of the Irish potato in southern Idaho, L. A. PRATT (*Jour. Agr. Research [U. S.], 13 (1918), No. 2, pp. 73-100, pls. 2, figs. 4*).—An account is given of investigations conducted by the Bureau of Plant Industry of this Department on the relation of soil fungi to certain diseases of potatoes. In a former publication (E. S. R., 35, p. 751) it was shown that planting disease-free potatoes on land that had never been in cultivation could not be considered a guaranty of a disease-free product.

In order to verify this conclusion, plantings of disease-free seed were again made in 1916 on lands that had never been in potatoes, and the results of the examination made when the tubers were dug are given. As in the previous experiments, the percentage of infection was found lower on irrigated, previously cultivated land than on virgin desert land.

During 1916, in addition to the field work with potatoes, cultures were made from the soils, from which more than 70 species of fungi were isolated. Among these there were quite a number of species of Fusarium, several of which are described as new species. Three fungi, *F. radicicola*, *F. trichothecioides*, and *Rhizoctonia solani*, known to be parasitic on the potato, were isolated from soils never cropped to potatoes. The presence of these and other fungi suggests that infection in potatoes may often originate with soil organisms.

From the results of these experiments it is suggested that land previously planted to such crops as alfalfa, clover, and grain is better adapted to the production of disease-free potatoes than virgin desert land.

Investigations on potato diseases (eighth report), G. H. PETHYBRIDGE (*Dept. Agr. and Tech. Instr. Ireland Jour., 17 (1917), No. 4, pp. 595-605, pls. 2*).—These investigations as carried on during 1916 were more limited in scope than formerly (E. S. R., 37, p. 350).

Phytophthora infestans appeared first at Rockfield on June 6, becoming prevalent over the country about the middle of July. A summary is given of the tests made of the relative efficiencies of 1 per cent and 2 per cent copper

sprays in this connection. This would indicate that a strength of 1 per cent may be advantageous under ideal conditions of application, but that as a practical treatment 2 per cent is probably to be preferred. Resistance appears to have been weakened in certain varieties hitherto valued for that quality. The resistance factor for blight (*P. infestans*) is not protective against pink rot (*P. erythroseptica*).

Botrytis disease (*B. cinerea*) has not yielded any evidence that Botrytis is a stage in the life history of *Sclerotinia fuckeliana*, as has been supposed by some investigators.

It has been found that potato tubers are most susceptible to dry rot (*Fusarium caeruleum*) as the time approaches at which sprouts normally appear. This fungus does not produce a wilt of potato.

It has been found that *Verticillium albo-atrum* can be at least rendered harmless in the tissues of potato tubers kept in an incubator at 46° C. (114.8° F.) for 10 hours, no injury resulting to the potatoes, while exposure for 20 hours apparently impairs the vitality of the tubers to some extent.

Gravy eye, or mattery eye, in potatoes, R. WATERS (*Jour. Agr. [New Zeal.], 14 (1917), No. 5, pp. 357–362*).—It is stated that much damage has been done since 1916 in the vicinity of Pukekohe by a bacterial disease of potato, the general characters of which agree with those of the American black rot of potatoes due to *Bacillus solanacearum*. The virulence of the outbreak appears to be related to heat and moisture, poor drainage being especially favorable to the trouble.

Copper sprays for late blight of potato, P. CHAVAN (*Ann. Agr. Suisse, 38 (1917), No. 2, pp. 206–216, figs. 2*).—Giving the results of variety and other tests regarding late blight (*Phytophthora infestans*) of potato, the author states that choice of resistant varieties is of the highest importance, although resistance is subject to variation, especially in different soils or circumstances. Preventive measures include careful selection, for planting purposes, of whole tubers known to be of resistant stock; keeping seed potatoes in cool, dry, well-aired cellars; and arrangement of the rows in planting to agree with the direction of the prevailing winds.

Bordeaux mixture to be applied as a preventive should not run below 2 per cent strength as regards copper sulphate. This should be applied at least three times in case of clayey soil or susceptible varieties during years of high humidity. Care should be taken to wet the lower surface of the leaves.

Stem nematodes as tobacco pests, T. A. C. SCHOEVERS (*Tijdschr. Plantenziekten, 23 (1917), No. 5, pp. 167–180, pls. 2*).—An account is given of attacks by a nematode (*Tylenchus devastatrix*) on stems of growing tobacco and the effects on the plant.

Tomato diseases in Ohio, J. G. HUMBERT (*Ohio Sta. Bul. 321 (1918), pp. 157–196, figs. 13*).—Descriptions and suggestions for control, so far as definite means are known, are given for the following parasitic diseases: Rhizoctonia and other damping-off fungi, Fusarium wilt, bacterial wilt, stem rot or timber rot, leaf spot or leaf blight, early blight, late blight, anthracnose, Botrytis rot, leak, leaf mold, and root knot due to nematodes. In addition, the following physiological diseases are described: Point rot, hollow stem, mosaic, and blossom drop.

In connection with experiments for the control of Fusarium wilt, the author gives the results of two years' trial of resistant strains. It appears from these tests that certain strains of the more common varieties of tomato show very marked differences in the percentage of plants subject to attack.

[Orchard sprays, hose, and nozzles], B. W. DOUGLASS (*Trans. Ind. Hort. Soc. 1916, pp. 89–96, figs. 2*).—In a report, followed by discussion, regarding

preferences in orchard spraying for diseases as well as insects, it is stated that the single Vermorel nozzle is on the whole the best for all purposes. The best kind of hose is one having a thick inner tube of rubber, around which are wound seven layers of fabric in spiral sheets, and not in a series of woven tubes which would stretch in length and contract in diameter.

Bordeaux mixture fully up to the standard is said to have been obtained by the employment of a method which is described as very simple, convenient, and comparatively inexpensive. A copper solution is employed in which 1 gal. of water represents 1 lb. copper sulphate. This is prepared in an overhead tank from which it is to be fed by gravity into the sprayer tank, each vertical inch of this tank representing a definite number of pounds of copper sulphate. The sprayer tank is first filled with clear water from a pressure tank, the proper amount of lime is added under agitation from the sprayer engine, and to this the copper is added while the engine is running.

The rôle of insects as carriers of fire blight, H. A. Gossard (*Rpt. Proc. Ohio State Hort. Soc., 19 (1916), pp. 84–90*).—This is an attempt to summarize what is known of the carriers of fire blight, from which Ohio orchards are said to have suffered severely during several seasons. The weather conditions during this time have encouraged the multiplication of aphids, which are thought to be instrumental in the dissemination of the disease, especially in starting the infection early in the season. The general adoption of the mulch system and the increased use of barnyard manure and in general of nitrogenous fertilizers and deemed contributory (sensitizing) factors.

The author considers the possibility that bees may carry infection into the hive. This may become a very important source of infection for blooms on trees in the areas tributary to such a hive.

The possible agency of other insects is also discussed in this connection.

Apple bitter rot and its control, J. W. Roberts and L. Pierce (*U. S. Dept. Agr., Farmers' Bul. 938 (1918), pp. 14, figs. 3*).—A description is given of apple bitter rot caused by *Glomerella cingulata*, together with directions for its control. The suggested means of control include removal of sources of infection and spraying with Bordeaux mixture.

Brown bark spot disease, H. E. Morris (*Rpt. Proc. Mont. State Hort. Soc., 3 (1916), pp. 58–62, figs. 4*).—A brief discussion is given of the recognition in 1910 and subsequent study of the brown bark spot of apple. Standard varieties and some other fruits are also affected in the same way. Apple and pear are severely attacked, but only a few cases are known to have occurred on plum and prune. Crab apple, also sweet and sour cherries, showed the symptoms, which are described. Bearing apple trees are killed in three to five years, pear trees in two to four years. The specific cause of the trouble is not known. Insect inoculation has given uniformly negative results.

The effects of fertilizers and spraying are to be tested on a block of trees in a commercial orchard.

Apple scab control, R. H. Roberts and G. W. Keitt (*Ann. Rpt. Wis. State Hort. Soc., 47 (1917), pp. 46–56*).—Presenting the results of cooperative work and observation, the authors agree that as possible fungicides for use against apple scab Bordeaux mixture excels in effectiveness as regards fungicidal action, lime-sulphur as regards freedom from injury to fruit and foliage, and a treatment combining the two offers opportunity for adaptation to weather and other conditions as may appear appropriate in given circumstances. It is stated that lead arsenate added as an insecticide improves the fungicidal value of lime-sulphur.

Near Madison, Wis., but few apparently mature spores were found from Apr. 26 to May 4, but on May 9 they appeared in considerable abundance. It is thought that the first application should be delayed, if possible without too great infection, until the young fruits have separated in the clusters sufficiently to be thoroughly covered by the spray.

A bacterial blight of pear blossoms occurring in South Africa. E[illegible] Dodge (*Ann. Appl. Biol., 4 (1917), No. 1-2, pp. 50-74, figs. 7*).—The author gives the results of her study of a disease affecting pear blossoms. An organism associated with the trouble was studied in comparison with the fire blight organism (*Bacillus amylovorus*) and the one studied by Barker and Gale (E. S. R., 36, p. 751) in connection with a disease of fruit blossoms and of the gooseberry. This organism appears to be distinct from both of those mentioned, and is probably a new species. The author, therefore, describes the organism under the name *Bacterium nectarophilum*.

The control of plum pocket and leaf gall mite on native plum. L. R. Swingle and H. E. Morris (*Rpt. Proc. Mont. State Hort. Soc., 19 (1916), pp. 29-34, figs. 3*).—The authors give a short account of observations and tests for control of plum pockets, associated with *Taphrina pruni* and in later stages with a Cladosporium (which may also be parasitic), and on a leaf gall mite (*Eriophyes pruni*).

In this connection, they state that trees sprayed April 29 and May 7 with lime-sulphur were on June 21 comparatively free from galls. Trees sprayed for this trouble in 1915 with self-boiled lime-sulphur on April 23, May 7 and 21, and June 9 showed not over 1.35 per cent diseased fruits, while the checks showed 55 per cent and other unsprayed trees ranged as high as 60 to 90 per cent. Recommendations include spraying with lime-sulphur at winter strength (sp. gr. 1.025 or 3.5° Baumé) early in April or just when the buds begin to swell, and if the gall mite is present, with self-boiled lime-sulphur (8:8:50) when the flower buds are in the pink, the treatment to be repeated when most of the petals have fallen.

Report on [citrus canker] eradication work for quarter ending December 31, 1917, F. Stirling (*Quart. Bul. Plant Bd. Fla., 2 (1918), No. 2, pp. 127-131*).—Reporting further on citrus canker (E. S. R., 37, p. 556), the author states that up to December 31, 1917, citrus canker had been found in 22 Florida counties on 477 properties, 62 being still classed as infected. Three in one county still showed active infection, but none of these infections were considered as new. The number of infected trees ranged much lower during 1917 than during the three previous years, showing a maximum in April.

Citrus blast. R. W. Hodgson (*Quart. Bul. Plant Bd. Fla., 2 (1918), No. 2, pp. 123-130, figs. 3*).—This is a brief account of the diseases of citrus trees which is said to be caused by *Bacterium citrarefaciens*, as described by Lee (E. S. R., 37, p. 154). It has spread with increase in virulence since 1907 until it now exists in all citrus-producing districts of northern and central California, though not yet known to be present in the southern part of the State.

A simple and effective method of protecting citrus fruits against stem end rot, J. M. Rogers and F. S. Earle (*Phytopathology, 7 (1917), No. 5, pp. 361-367*).—In a study of the rot organisms of citrus fruits, the authors found that over 83 per cent of the rot is caused by a species of Diplodia. Inoculation experiments showed that perfectly sound fruit in all conditions of maturity could be rotted down through the stem end if moisture conditions were favorable. The discovery of these facts led to an investigation of means of preventing the entrance of the organism to the stem end of the fruit.

Sealing the stem ends of the fruit was undertaken with very satisfactory results. By the application of shellac to the stem end of citrus fruits, it is claimed that the stem end rot may be prevented to a very considerable degree. For the treatment to be most effective, the fruit should be pulled and not clipped. Washing the fruit was found to increase the amount of decay to a great extent. It is thought that avocados, watermelons, and other fruits could possibly be protected from stem-end rot by the same treatment. A thin coating of paraffin over the fruit was found to prevent shriveling and drying and to keep the fruit from a month to six weeks longer than fruit not so treated.

Pulling fruit instead of clipping to prevent stem rot (*Cal. Citrogr., 3 (1918), No. 5, p. 100*).—This refers to the article above noted regarding the measures recommended as lessening the amount of stem end rot of citrus fruits due to handling, and the possible applicability of these measures to other fruits.

Effect of disinfectants upon Bacterium citri, R. A. JEHLE (*Quart. Bul. Plant Bd. Fla., 2 (1918), No. 2, pp. 112–133, figs. 2*).—The author gives an account of the methods and results of tests with various strengths of different disinfectants upon *B. citri*.

Susceptibility of noncitrus plants to Bacterium citri, R. A. JEHLE (*Phytopathology, 7 (1917), No. 5, pp. 339–344, figs. 3*).—Inoculation experiments with pure cultures of *B. citri* were made on various noncitrus plants to determine their susceptibility to citrus canker disease, particular attention being given to species belonging to the Rutaceæ.

No infections were obtained from any of the experiments except in the case of the orange jessamine (*Murraya exotica*) and the wild lime (*Zanthoxylum fagara*). The author states that lesions have been occasionally noted on twigs of *Z. fagara* growing wild in Dade County, Fla., but no evidence has been secured of abundant natural infection of this plant with the bacteria of citrus canker.

Orange diseases, R. AVERNA-SACCA (*Bol. Agr. [Sao Paulo], 18. ser., No. 4 (1917), pp. 334–346, figs. 5*).—This is mainly a discussion of gummosis (*Bacterium gummis*) of orange and related fruits in connection with their different degrees of susceptibility to the disease. Among the fungi noted in this connection are *Nectria* sp., *Myriangium citri*, and *Eutypa lutibunda*.

A leaf blight of Kalmia latifolia, ELLA M. A. ENLOWS (*Jour. Agr. Research [U. S.], 13 (1918), No. 3, pp. 193–212, pls. 4, figs. 2*).—As a result of studies, carried on since 1914 in the Bureau of Plant Industry of the U. S. Department of Agriculture, on a leaf spot or blight, of mountain laurel (*K. latifolia*), the author has isolated a fungus which has been shown to be parasitic and to cause the appearances described. The causal organism is described as a new species under the name *Phomopsis kalmiæ*.

A twig and leaf disease of Kerria japonica, V. B. STEWART (*Phytopathology, 7 (1917), No. 6, pp. 399–407, figs. 7*).—A description is given of *Coccomyces kerriæ* n. sp., which is said to attack both the leaves and shoots of *K. japonica*. Cultural studies and inoculation experiments have been carried out with the fungus.

The occurrence of the fungus upon the host is first indicated by the appearance on the leaves of small discolored areas which soon become reddish-brown in color. The lesions may become confluent, involving a considerable portion of the leaf. When severely attacked, the leaves turn yellow, shrivel, and fall prematurely, but there is no shot-hole effect resembling that produced by certain species of Cylindrosporium on the leaves of other plants. On the shoots, the lesions are circular, reddish-brown to black in color, and vary from one

to several millimeters in diameter. In old lesions, portions of the cortical tissue may fall out, leaving the woody tissue exposed. Often the diseased areas are so abundant as to girdle the shoot completely.

No carefully conducted experiments seem to have been performed for the control of this disease, but the author states that preliminary tests made in 1916 indicate that a sulphur fungicide may prove effective in checking the trouble.

Investigation of bulb rot of narcissus.—I. The nature of the disease, E. J. WELSFORD (*Ann. Appl. Biol.*, 4 (1917), *No. 1–2, pp. 36–46, figs. 5*).—The author gives an account of infection experiments and other studies carried on with the various organisms which have been found in connection with bulb rot of narcissus. It is claimed that this trouble is not due to *Fusarium bulbigenum* as held by Massee (E. S. R., 30, p. 354), but that it is caused by a nematode (*Tylenchus devastatrix*). A description is given of the symptoms and nature of the disease, and precautionary measures are suggested.

Two new forest tree rusts from the Northwest, H. S. JACKSON (*Phytopathology*, 7 (1917), *No. 5, pp. 352–355*).—A description is given of *Cæoma weirii* n. sp., occurring as a parasite on *Picea engelmanni;* and of *Melampsora occidentalis* n. sp., which has been collected on a number of species of Populus.

On a disease of the beech caused by Bulgaria polymorpha, R. J. TAMBLYN and KATE BARRATT (*Ann. Appl. Biol.*, 4 (1917), *No. 1–2, pp. 20–37, pl. 1*).—The authors describe a serious gumming disease of old pollard beech trees at Burnham Beeches. Associated with the diseased condition was the fungus *B. polymorpha*, which also attacked old trees to which diseased bark or mycelium had been applied. Young trees, however, resisted completely the fungus in repeated tests.

Rhizina inflata, a root parasite of conifers, H. A. A. VAN DER LEK (*Tijdschr. Plantenziekten, 23 (1917), No. 6, pp. 181–194, pls. 2*).—A brief discussion is given of the known history, the several hosts, and the distribution of *R. inflata*.

Development of blister rust æcia on white pines after they had been cut down, W. A. MCCUBBIN and G. G. POSEY (*Phytopathology*, 7 (1917), *No. 5, pp. 391, 392*).—The authors report the development on white-pine trees of blister rust æcia, the spores remaining viable six to eight months after the trees had been felled.

Preliminary report on the vertical distribution of Fusarium in soil, MINNIE W. TAYLOR (*Phytopathology*, 7 (1917), *No. 5, pp. 374–378*).—The author reports considerable trouble having been experienced with the damping-off of seedlings of *Pinus resinosa* and *P. ponderosa* caused by a species of Fusarium in the botanical gardens of Brown University, Providence, R. I. This led to a study of the vertical distribution of the fungus in seed beds, white-pine groves, and adjacent grasslands.

It was found that the Fusarium present occurred to a depth of 24 inches in the nursery soil, and it was present in more samples of soil from the nursery than from grassland. The fungus appeared in cultures from more samples in March than in the previous winter months, indicating a possible seasonal variation.

A canker of Eucalyptus, S. C. BRUNER (*Estac. Expt. Agron. Cuba Bol. 8 (1917), pp. 33, pls. 8, fig. 1*).—This is an account of studies carried out on a canker or rot of Eucalyptus noted near Habana and Santiago de las Vegas. The attacks develop on the trunk and larger branches. The causal organism is supposed to be a new species, and is described under the name *Diaporthe cubensis*. It is found to be cultivable on various media. The various spores

Eucalyptus are found to differ considerably as regards resistance to the ..., some appearing to be completely immune.

Cause of the spike disease of sandal (Santalum album), R. S. HOLE (*In... Forester, 43 (1917), No. 10, pp. 429–442*).—The author has studied spike ... *album* in the forests of Coorg during two seasons and has tested the effect ... factors on the growth of sandal. He holds that the condition known ... spike, which affects particularly *S. album* and *Zizyphus œnoplia*, is induced ... unbalanced circulation of sap caused by a slowly decreasing water supply ... factor retarding growth or interfering with the translocation of organic ... This condition is claimed to be due to different factors, the operation of ... in case of these two trees is discussed in some detail. These factors in... ... fires, the sole cause of spike in *Z. œnoplia*, also for *S. album* death or ... injury of hosts, their partial suppression by other growths, and ex... ... of trees formerly grown under shade.

... is thought that the explanation here offered may prove to be applicable ... diseases as peach yellows and such factors as injudicious pruning.

Notes on wood-destroying fungi which grow on both coniferous and ... trees, II, J. R. WEIR (*Phytopathology, 7 (1917), No. 5, pp. 379, ...*). In continuation of a previous report (E. S. R., 32, p. 54) the author ... additional collections of fungi found growing on both coniferous and de... trees.

ENTOMOLOGY.

Insect pests and plant diseases, Z. P. METCALF (In *The Rural Efficiency ... —III, Agriculture Book, compiled by R. W. Correll. Cleveland, Ohio: ... Peoples Efficiency Publishing Co., 1918, pp. 213–368, figs. 177*).—A popu... summary of information dealing particularly with insects and means for ... control.

Studies in Kansas insects.—A treatise descriptive of the more common ... species (*Bul. Univ. Kans., 18 (1917), No. 1, pp. 329, figs. 358*).—The several ... pers here presented are as follows: The Grasshoppers of Kansas.—I, The ... of Kansas, by P. W. Claassen (pp. 5–50); Grasshoppers of Kansas.—... The Œdipodinæ of Kansas, by R. Beamer (pp. 51–126); The Dragonflies of ... Kansas: The Odonata of Kansas with Reference to Their Distribution, by ... H. Kennedy (pp. 127–160); Scale Insects Injurious to Fruit and Shade Trees: ... Coccidæ of Kansas, by P. B. Lawson (pp. 161–279); and The Cankerworm, ... Orchard and Shade Tree Pest, by W. H. Wellhouse (pp. 281–324).

... report upon the Coccidæ of Kansas by Lawson lists 75 species, 12 of ... are for the first time reported from the State, while two, *Orthezia am...* and *Ceroplastodes deani*, are described as new to science.

Reports on economic entomology in India] (*Rpts. Agr. Research Inst. ... Pusa, 1915–16, pp. 58–77, 78–84, 92–94; 1916–17, pp. 71–102, 111–117*).—... reports here presented include for each year those of T. B. Fletcher as ... entomologist and as imperial pathological entomologist, on the occur... ... and work with the more important insects of the year and on disease-... insects, ticks, etc., respectively, and of C. M. Hutchinson, imperial ... bacteriologist, on pebrine.

Report of] work of the division of entomology, E. JARVIS and J. F. ... (*Ann. Rpt. Bur. Sugar Expt. Stas. [Queensland], 17 (1917), pp. ...*).—A brief report is given of the research and practical work being ... on in north Queensland, particularly with the cane beetles *Lepidiota ... lata* and *L. frenchi*.

Calcium arsenate v. lead arsenate, J. R. STEAR (*Mo. Bul. Ohio Sta., 3 (1918), No. 5, pp. 156–158*).—Attention is here called to the uniformly favorable results that have been obtained in the use of calcium arsenate, which, together with the fact that a considerable saving in cost can be effected, have led the author to advise that it be given a trial.

Practical suggestions regarding the fumigation of greenhouses, G. L. STONE (*Jour. N. Y. Bot. Gard., 17 (1916), No. 199, pp. 97–103; abs. in Internat. Inst. Agr. [Rome], Internat. Rev. Sci. and Pract. Agr., 7 (1916), No. 12, pp. 1858, 1859*).—In experiments made in a greenhouse during the spring months five sets of cucumber plants were grown under cloth screens where the relative light intensity to which the plants were subjected was controlled for different intensities, but with all other conditions as nearly uniform as possible. The susceptibility to burning from fumigating with hydrocyanic acid gas was greatest in the plants developed under poor light conditions and the amount of burning decreased proportionately as the light conditions improved. Experiments were also made with cucumber plants grown in soils with varying percentages of soil moisture ranging from 10 to 70 per cent of their total water-retaining capacity.

"In respect to the influences of light alone, it appears that the largest and most vigorous plants were most resistant; but in respect to moisture supply the smaller, slow-growing plants that developed with the lower water supply were most resistant. Such results indicate clearly that the general conditions under which plants develop, or under which different organs such as leaves develop are of decided influence in determining the susceptibility of the plant or the organ. . . . Some plants are more susceptible to injury from fumigation than others. Plants with tender foliage or those that have been forced are more likely to suffer injury. The injury to any plant, however, may be greatly decreased or entirely obviated by the due consideration of the conditions of development and the daily periodicity of the plant's activity in the regulation of the dosage and the time of application."

A convenient type of hydrocyanic acid gas generator for fumigating vineyards for the destruction of the mealy bug (Pseudococcus capensis) C. W. MALLY (*So. African Jour. Sci., 13 (1917), No. 11, p. 621, pls. 2*).—The author briefly describes and gives illustrations of a generator made of lead, the essential feature of which is a pair of tubes in the lid, one for the acid and the other for the cyanid solution.

Insect and other enemies of beans, E. R. DE ONG (*California Sta. Bul. 284 (1918), pp. 344–347*).—This is a brief summary of information on the more important bean insects in California and means for their control, including the bean weevil; horse bean weevil (*Bruchus rufimanus*), which feeds only on the horse bean; the red spider (*Tetranychus telarius*), a serious pest of the summer-grown beans, except Garbanzo and Blackeye; the bean thrips (*Heliothrips fasciatus*); the bean aphis (*Aphis rumicis*); flea-beetles; *Diabrotica* spp.; grasshoppers; and wireworms.

Insects and other animals attacking the cacao tree in the Belgian Kongo, R. MAYNE (*Roy. Belg. Min. Colon. Serv. Agr., Études Biol. Agr., No. 3 (1917), pp. 80, pls. 5, figs. 15*).—A summary of information relative to the enemies of *Theobroma cacao*.

Some stone flies injurious to vegetation, E. J. NEWCOMER (*Jour. Agr. Research [U. S.], 13 (1918), No. 1, pp. 37–42, pls. 3*).—During the course of work by the Bureau of Entomology of the U. S. Department of Agriculture the author made studies of several western species of Plecoptera of the genus Taeniopteryx, including *T. pacifica*, *T. pallida*, and *T. nigripennis*, the members of

...b, unlike other genera of the order, are equipped with well-developed mouth ...rts and feed upon the buds and leaves of plants.

Preliminary studies were made of one species in particular, *P. pacifica*, which ...proved to be of considerable economic importance in Wenatchee Valley in ...tral Washington where it is known as the "salmon fly." This species is ...economic importance through its habit of appearing as the fruit buds are ...ginning to push out, eating large holes in them, and frequently destroying ...m entirely. Even where the injury is not so severe the blossoms and leaves ...eloping from these buds are deformed and ragged. The ovary of the blos... is very often injured, resulting in deformed fruit. Later the insects feed ...the calyxes and corollas of the blossoms, on the young fruit, and on the ...der foliage. Apricots, peaches, and plums are the most seriously injured. ...rries are not so noticeably injured, the buds being harder and the young ...ge sticky, while the damage to apples and pears is negligible, as their buds ...e tougher and they blossom later.

The injury by this stone fly was quite noticeable, especially in the lower part ...the Wenatchee Valley, known as the Rock Island district, where there are ...tensive orchards near the Columbia River. In that district many growers ...orted it as seriously damaging their apricots and peaches, necessitating ...e discarding of much of the fruit. Examinations made of the shores of the ...lumbia River showed the flies to be emerging in large numbers, but they ...d not be found in the smaller streams.

While the press of other work prevented the carrying out of any extensive con...l experiments, it was observed in 1915 that plum trees which had been sprayed ...h crude-oil emulsion and nicotin sulphate for aphids were not as badly ...ured as those not sprayed. Examination on April 3, 1916, of an apricot ...hard, part of which had been sprayed about April 1 with lead arsenate at ...e strength ordinarily used for the codling moth on apples (2 lbs. of lead ...senate to 50 gal. of water), at which time the buds were beginning to show ...ink, showed 60 per cent of the buds to be injured, while only 24 per cent on ...e sprayed tree were injured, and it is quite probable that much of this latter ...jury was done before the sprays were applied, as the flies had been numerous ...r over a week.

Technical descriptions are given of its several life stages and of the mouth ...rts. Brief notes are presented on other species observed and native food ...nts fed upon.

An investigation of the scarring of fruit caused by apple red bugs, H. H. KNIGHT (*New York Cornell Sta. Bul. 396 (1918), pp. 187–208, figs. 37*).—The ...ata here presented are based upon an extensive series of observations, com...enced in 1914, on the production and development of scars caused by insects ...order to make it possible for orchardists to recognize the scars on apples at ...king time and the insects causing them and to deal more intelligently with ...ch foes.

Gratifying results were obtained in studies made of the two red bugs, *Lygidea ...dax* and *Heterocordylus malinus*, the present paper dealing chiefly with the ...jury produced by the former since it was found that *H. malinus* is practically ...egligible in the production of scars on the fruit. It was found that the different ...rieties of apples when injured by red bugs would develop different kinds of scars ...A series of photographs was made for each of the commercial varieties, many ...f which are here presented to illustrate the variations, as well as those pro...ced by the plum curculio combined with the rosy aphis (*Aphis sorbi*) and ...ost, lime-sulphur spray, rubbing against limbs, pin punctures, etc.

Certain varieties of apples are more subject to fatal injury than are others, ...gs the Twenty Ounce and varieties of pippin, which develop rapidly, can with-

stand or recover from wounds that cause the dropping of slow-growing varieties such as the Northern Spy. "If the core of the young apple is punctured by feeding red bugs, the flesh of the fruit never grows back at the point of puncture and a deep pit results in the mature apple."

The work is presented under the headings of growth of fruit in relation to time of injury, a factor in the type of scar developed; development of *L. mendax* in relation to the growth of the tree and the fruit; red-bug injury combined with injury by rosy aphis; varieties of apples injured by *L. mendax;* warty scars; injuries that may be confused with red-bug injury; scars produced by frost injury; scars produced by spray injury; mechanical injuries; experiments in producing scars by pin punctures; notes on the control of *L. mendax;* etc.

The varieties of apples most affected by *L. mendax* in Genesee County were found to be, in the order of greatest injury suffered, Rhode Island Greening, Northern Spy, Baldwin, Roxbury, Tolman, Tompkins King, Maiden Blush, Twenty Ounce, Esopus, and Fall Pippin.

The false apple red bug, H. A. GOSSARD (*Mo. Bul. Ohio Sta., 3 (1918), No. 5, pp. 153–155, figs. 3*).—A popular summary of information on *Lygus mendax.*

Suggestions for a new method of destroying chinch bugs, W. P. FLINT (*Jour. Econ. Ent., 11 (1918), No. 2, pp. 186–188*).—A brief report of experiments which show that it is possible to destroy chinch bugs in large numbers by the use of soluble poisons.

Notes on the woolly aphis, G. G. BECKER (*Jour. Econ. Ent., 11 (1918), No. 2, pp. 245–255, pl. 1*).—This is a report of biological studies conducted in the Ozarks in Arkansas.

"The life history of *Eriosoma lanigera* in the Ozarks is the same as reported for Maine and for Vienna, Va., with the exception that there are probably more than two generations of apterous viviparæ on apple and Crataegus. Experiments with apple root forms indicate that there may be from six to twelve generations a year in the Ozarks. Elms have acquired a strong degree of immunity to this species. Susceptibility to attack seems to be correlated with backwardness of growth in the spring. *Crataegus crus-galli* is largely immune to the insect, the condition of immunity being apparently inherent in some instances and conditional in others. Northern Spy stock is immune to the species. Apterous viviparæ from Crataegus will establish on apple and apterous viviparæ from apple will establish on Crataegus, though the Crataegus individuals do not establish as readily on apple as do the individuals from the same host.

"Based on a study of the antennæ, the writer's data indicate that *E. crataegi* Oestlund is a synonym of *E. lanigera* Hausmann."

Some factors influencing the distribution of Pemphigus betæ in beet fields, A. C. MAXSON (*Jour. Econ. Ent., 11 (1918), No. 2, pp. 231–236*).—A report of studies of the beet aphis in Colorado.

Concerning the discovery of a food plant of the silkworm, H. FUKUDA (*Bul. Assoc. Séri. Japon. No. 24 (1917), pp. 1–6, pls. 2*).—The author reports feeding experiments with *Lactuca brevirostris,* which show it to be a valuable food plant for the silkworm.

The pink bollworm (Gelechia gossypiella) in Egypt, H. A. BALLOU (*Jour. Econ. Ent., 11 (1918), No. 2, pp. 236–245*).—A report upon biological and control work with the pink bollworm ([*Gelechia*] *Pectinophora gossypiella*) conducted by the author in Egypt.

Municipal control of the spring canker-worm, S. J. HUNTER (*Jour. Econ. Ent., 11 (1918), No. 2, pp. 164–167*).—An account of control work conducted by

city of Lawrence, Kans., in the eastern half of which State the spring cankerworm has been unusually abundant and destructive the past two years, both in the cities and in the native woods. The biological studies conducted are also noted from another source on page 255.

Further notes on Laspeyresia molesta. W. B. Wood and E. R. Selkregg (U. S. *Dept. Agr., Research* [*U. S.*], *13* (*1918*), *No. 1, pp. 59–72, pls. 6*).—This is a report of investigations of the oriental peach moth by the Bureau of Entomology of the U. S. Department of Agriculture at Rosslyn, Va., in continuation of work previously noted (E. S. R., 36, p. 358).

It has been found that an insect doing considerable injury to peaches and apples in Japan is no other than this insect, specimens sent to this country having been identified as *L. molesta*. It is pointed out in the introduction that owing to the number of generations which develop in a single season it is particularly hard to control, and this fact, together with its wide range of food plants, would seem to make it a pest of as great importance as its near relative, the codling moth. In addition to the host plant previously recorded, including peach and the various cultivated species of Prunus (cherry, plum, apricot, and several varieties of flowering cherries), this moth has been reared from quince, pear, apple, and flowering quince, and has been found to attack pear and apple almost as readily as the peach and the injury caused undoubtedly would be very severe in a large plantation. The quince appears to be the favorite food plant of the pome fruits. In addition to the District of Columbia and adjacent territory, it is known to occur in northern New Jersey, New York City, Long Island, and Stamford, Conn., but with the exception of the vicinity of Washington, D. C., the fruit-growing industry is unimportant in all the localities where it occurs.

It causes two distinct types of injury, one to the twig and the other to the fruit, the nature of which is considered at some length. The injury to the twigs is particularly severe on young trees and occurs mostly before midsummer, while the twigs are yet soft; the injury to fruit does not become severe until after August 1. Among the insects mentioned as likely to be confused with the oriental peach moth in the larval stage, either because of a close resemblance or because of a similarity in the injuries which they cause, are the codling moth, the lesser apple worm, the peach twig borer, and *L. pyricolana*.

In life history studies made during 1917 near Rosslyn, it was found that the hibernating larvæ pupate in mid-March and commence to emerge about mid-April, when peaches are in full bloom, continuing through the first three weeks of May. The preoviposition period ranges from 2 to 12 days with an average of 7.5 days, the first eggs being found in a peach orchard on May 3. Oviposition began May 2 and continued until late in the fall, the last egg observed being laid October 8. Normally the eggs are deposited singly on the underside of the leaves and in the orchard they were not found in any other place. The average incubation periods of the eggs of the first three generations were 7.5, 6.5, and 3.1 days, respectively, for the fourth and fifth generations, collectively, 8.3 days.

"When the young larva hatches it immediately starts on its search for a favorable feeding place. In one instance 20 minutes were required after hatching for a larva to explore three peach leaves and to make its way to the tender growth at the terminal, where it bored into the interior of the peach shoot. The larvæ do not feed as they enter but withdraw their heads from the burrow and cast aside the fragments of tissue until the more succulent interior of the twig is reached. If the young larvæ fail to locate favorable feeding places in a short time, they undoubtedly die, for in the rearing jars they die within 12 hours after hatching."

The feeding period ranges from 8 to 16 days in length throughout the entire season, the average for 59 larvæ being 11.2 days. When fully developed the larva leaves the twig or fruit where it has been working and starts in search of a favorable place for spinning its cocoon. The spring and midsummer cocoons are formed mostly in the axils between twigs or on the fruit at a point where it is attached to the stem. The time from spinning the cocoon to pupation is from 2 to 9 days, with an average of 3 days. The pupa period covers from 5 to 12, with an average of 7.8 days. In 1917 the adults emerged from April 16 to October 30, though only a few straggling individuals emerged after October 5. The number of eggs deposited in rearing jars varied from 1 to 391. Technical descriptions are given of its life stages.

The winter is passed in the larva stage in cocoons formed in the autumn after the larvæ are fully developed. In the peach orchard a large percentage of overwinter insects spin their cocoons in small cracks in the bark, under bark flakes, and in curled ends of bark strips on the trunk and large branches of the trees.

Eight species of hymenopterous parasites, six of which are primary and two secondary parasites, and one dipterous parasite, *Hypostena variabilis*, have been reared. Of the primary hymenopterous parasites, *Macrocentrus* sp., also parasitic on the codling moth, attacks and develops within feeding larvæ spinning its cocoon within the cocoon of the host, and is the most abundant. *Phaeogenes* sp., which emerges from the pupæ of the host and probably attacks the insects in the prepupa or pupa stage, was second in abundance. Several specimens of *Ascogaster carpocapsæ* were reared, as was one specimen each of *Spilocryptus* sp., *Mesostenus* sp., and *Glypta vulgaris*.

In control work arsenate of lead, though applied to the fruit, foliage, and twigs just before the eggs were due to hatch, did not prevent the larvæ from entering the twigs and fruit and gave no degree of control. Other applications in addition to this one, made at such times as it was thought the insect would be most vulnerable to attack gave no better results in control. A 40 per cent nicotin sulphate solution, diluted to 1 part in 400 parts of water and applied in the same way and at the same time as the treatments with arsenate of lead did not control the insect, although counts made early in the season of the number of infested twigs on the sprayed and unsprayed plats seemed to indicate slight benefit from the treatment. A combination spray of lead arsenate and nicotin sulphate likewise gave negative results. Banding the trees with burlap resulted in the capture of a few larvæ, but most of the insects after leaving the twigs and fruit spin their cocoons around the fruit spurs, on the peaches, and in the axils of the twigs, thus making this operation a failure. Clipping the infested twigs from the trees and destroying them and destroying infested fruit gave partial control, but was too laborious to be practical.

Tests made of the killing power of miscible oils and nicotin sulphate when applied to the cocoons containing overwintering larvæ and directly to the insects by immersing them in the liquid resulted in the destruction of about two-thirds. Similar tests were made using 40 per cent nicotin sulphate at a dilution of 1:233 combined with the oil solution used above gave somewhat similar results. Fumigation tests with hydrocyanic acid gas made on overwintering larva in cocoons at the rate of 1 oz. of sodium cyanid to 100 cu. ft. of space for a period of 1 hour failed to kill the larvæ. The same results were obtained from fumigation in a 25-in. vacuum at the same and double the strength and time period. Thus it appears that it is impossible to free infested nursery stock of this insect by dipping or fumigation.

The oriental peach pest (Laspeyresia molesta), a dangerous new fruit insect of Maryland, P. GARMAN (*Maryland Sta. Bul. 209 (1917), pp. 16, figs.*

1.—This is a report of studies of the oriental peach moth, made at College rk, Md., which is about 11 miles east from the place at which the studies Wood and Selkregg, above noted, were conducted.

The author found the pest at College Park on peaches, apples, plums, and ricots. "The injury is confined largely to twigs, growing tips being the vorite food. As high as 90 to 100 per cent of all terminal buds may be ed, though as a rule only 50 to 70 per cent are destroyed. When the fruit gins to ripen or is partly grown, the larva frequently leaves the twig and ters the peach near the stem. The percentage of fruit infested has been und to vary from 5 to 15 per cent and the damage to the fruit may not, erefore, be considered as serious, certainly not as serious as the damage to nger trees where a general stunting of the growth of the tree results and bushy growth takes place instead of a more desirable one."

"The egg, like that of the codling moth, is deposited usually at a considerable stance from the initial feeding point of the larva, on the underside of the af, frequently on leaves as far below the tip as the fifth or sixth, a distance s far as 6 in. from its suitable food. The incubation period in midsummer ay be as short as 4 or 5 days. From 8 to 13 days with an average of 11 days as obtained as the length of the larval period. Larvæ obtained from eggs id later than August 25 hibernated in cocoons after September 1 and did t pupate. The length of the pupal period during the growing season varies om 9 to 13 days with an average of 10 days and the life cycle is completed about 26 days. A monthly recurrence of the larval infestation of the igs takes place, the earliest noted infestation of the twigs occurring in the eld on May 22, which means the possibility of four broods during the season, rovided a warm September is experienced. During 1917, however, the fourth rood was cut short by a cold September, when the temperature fell nearly 60° F."

Descriptions are given of the life stages of the moth and the manner of distinguishing it from several similar pests pointed out. Its distribution in Maryland at the present time is confined to counties adjacent to Washington nd Baltimore. It has not been seen on the Eastern Shore or in the peach-rowing districts of the mountainous western counties.

Two hymenopterous parasites have been observed by the author, *Trichogramma minutum*, which attacks the eggs and is the most important, and *Macrocentrus* sp., which has been reared from the larva, though not in excessive numbers.

The life-history studies show the most vulnerable stage to be that of the 2d or earlier larval stages because of the position of the egg and its distance rom the initial feeding ground of the larva. It is impossible to keep the oung twigs coated with arsenical poison, but it is possible to prevent the arvæ from entering the fruit by a thorough application. Care must be taken o coat the undersurfaces of the leaves in order to kill the egg or young larva. The pupa, so far as known, can not be effectively destroyed owing to the haracter of the cocoon, but winter sprays of lime-sulphur and, perhaps, others ay prove important as control measures.

The author's experiments indicate that twig injury may be reduced but idely by application of the usual insecticides. The most successful combi-ation during 1917 was a mixture of self-boiled lime-sulphur, calcium arse-ate, and tobacco, preceded by a winter application of concentrated lime-ulphur. Applications were made on April 30, May 24, June 15, and July 13, he concentrated lime-sulphur having been applied previous to April 30. This reatment gave a reduction of 31 per cent in twig injury, as compared with a

reduction of 24 per cent obtained from the use of the concentrated ... sulphur alone. Applications of nicotin and soap and nicotin and atomic ... phur showed no decrease in the amount of infestation over check plats. ... results of spraying tests for the control of the oriental peach pest, as d... mined by twig counts, are given in tabular form.

The author's recommendations for control are as follows: "Winter appl... tions with concentrated lime-sulphur should not be omitted. Calcium arse... 0.5 lb. to 50 gal., is recommended for summer use if combined with self-b... lime-sulphur and nicotin. If self-boiled lime-sulphur is not used, fre... slaked lime, 4 lbs. to 50 gal. of mixture, should be added. It should not be ... with atomic sulphur unless slaked lime is added. Applications should be m... at monthly intervals, the first application of arsenate with the dropping of ... bloom; the number of applications to be not less than three. This means ... modification of the usual program, which should conform more closely to t... used for apple. The following is suggested: Concentrated lime-sulphur (1 ... when the buds swell; self-boiled lime-sulphur (8:8:50) plus arsenate ... nicotin after the petals fall; the same mixture to be applied 2, 8, and 12 wee... later. Summer sprays should be carefully applied to the undersurfaces of ... leaves in order to kill the eggs or young larvæ. Applications of tobacco (n... tin sulphate or blackleaf 40) and soap can not be recommended for control ... the oriental peach pest."

Irregular emergence of codling moth at Hood River, L. CHILDS (*B... Fruit, 12 (1918), No. 8, pp. 10, 12, 13, 16, fig. 1*).—In this paper the aut... gives a brief summary of observations of the codling moth at Hood River, Oreg., during the years 1914–1917, inclusive, of which a report covering the earl... work has been previously noted (E. S. R., 35, p. 551).

These observations have shown that there is a very decided variation in t... emergence of the broods from one season to another under the climatic con... tions of this section. They emphasize the need for the establishment of ob... servation stations to obtain information on the insect's seasonal activity in t... widely separated apple-growing sections of the State for use by orchardists ... planning their spraying programs. The necessity for such stations in Illino... has previously been pointed out by Forbes and Glenn (E. S. R., 36, p. 853).

Seasonal irregularities of the codling moth, L. CHILDS (*Jour. Econ. Ent... 11 (1918), No. 2, pp. 224–231*).—This paper, which relates to the investigation... noted above, includes a brief résumé of the observations that have been ma... relative to the behavior of the codling moth at Hood River, Oreg., during th... years 1914, 1915, 1916, and 1917.

The codling moth (Carpocapsa pomonella), H. R. HAGAN (*Utah Sta. Cir... 30 (1918), pp. 4, figs. 2*).—A popular summary of information.

A study of the Japanese Lasiocampidæ and Drepanidæ, K. NAGANO (*Bu... Nawa Ent. Lab. [Japan], No. 2 (1917), pp. 3+45+140, pls. 10, figs. 9...*). Eighteen forms of Lasiocampidæ and 27 of Drepanidæ are recognized by t... author as occurring in Japan. Two genera each of Lasiocampidæ and ... Drepanidæ are erected and three species of Lasiocampidæ are described as ne...

The clover seed midge, H. A. GOSSARD (*Mo. Bul. Ohio Sta., 3 (1918), No... pp. 150–152, fig. 1*).—This is a popular summary of information on *Dasyneu... leguminicola*.

The mosquitoes of Colorado, T. D. A. COCKERELL (*Jour. Econ. Ent., ... (1918), No. 2, pp. 195–200*).—A summary of information on the occurrence ... mosquitoes in Colorado, in which notes are presented on 17 species thus ... identified from Colorado or Wyoming.

Dengue fever, C. C. MCCULLOCH (*New Orleans Med. and Surg. Jour... (1918), No. 9, pp. 694–706*).—In discussing the transmission of this disease...

... out that the status of species of mosquitoes, other than *Culex fatigans* ... may carry the disease, has not been fully determined. The quite con... association of *C. fatigans* in large numbers with dengue indicates that it ... probably the principal species concerned, though Brooks has stated that in ... epidemic which he observed [*Stegomyia*] *Aedes calopus* was the only mos... present. In Australia in 1916 *A. calopus* was proved experimentally to ... the vector.

Dengue fever in Australia.—Its history and clinical course, its experi... transmission by Stegomyia fasciata, and the results of inoculation ... other experiments, J. B. CLELAND, B. BRADLEY, and W. MCDONALD (*Jour. ... [Cambridge]*, *16* (*1918*), *No. 4. pp. 317–329, figs. 9*).—In dealing with ... transmission it is pointed out that epidemic dengue fever in Australia ... approximately coextensive with the known distribution of *Aedes calopus* [*scutellaris*]. *A. calopus* mosquitoes caught in a dengue infected district in ... surroundings of cases of the disease, and some of them known to have fed ... a dengue patient on the first and second days of his illness, when trans... to a nondengue district reproduced the disease in four out of seven ... on whom biting experiments were conducted. Blood taken from three ... four cases reproduced the disease when injected into noninfected indi...'s, the blood of one case not being tested. No evidence was obtained from ... cases, one of which was heavily and repeatedly bitten, that *Culex fatigans* ... capable of acting as a transmitter of dengue fever.

Overwintering of the house fly, R. H. HUTCHISON (*Jour. Agr. Research ... S.*], *13* (*1918*), *No. 3. pp. 149–170, pl. 1*).—This is a report of investiga... by the Bureau of Entomology of the U. S. Department of Agriculture, ... carried in the fall of 1914 at the Arlington Experimental Farm and con... during the two seasons of 1915–1917 at Bethesda, Md., which have led ... author to draw the following conclusions:

"In the latitude of Washington, D. C., the house fly may overwinter in two ... (1) By continued breeding in warm places where food and media for ... position are available, and (2) in the larva and pupa stages in or under ... manure heaps. There is no evidence whatever to show that house flies ... can persist as adults from November to April either outdoors, in pro... stables, or in attics or heated buildings. Temperatures of 12 or 15° F. ... quickly fatal, and there is every reason to believe that any temperature ... freezing is fatal if continued long enough. In heated buildings their life ... prolonged beyond that of summer at like temperature, nor is there any ... duction or retardation of sexual development or activity.

"It is known that house flies continue to emerge from manure heaps as late ... the first week in December. Many of these late forms will find their way on ... days to heated buildings, and those which do not are quickly killed. . . . ... food is available they may continue alive through December and January, ... even into February, if not destroyed by fungus attacks. But there are ... other experiments nor observations to show that they can continue through... the winter until temperatures are again favorable for outdoor activity ... egg laying. If flies find access in the autumn to heated buildings, where ... food and media for deposition are available, such as animal houses or res... in which sufficient attention is not given to the disposal of garbage ... kitchen wastes, they will continue breeding throughout the winter. In such ... the flies present in March and April are the offspring, not the survivors, ... those which found their way to such places the preceding autumn. It is ... able that this method of overwintering is much more widespread than is ... realized, especially in cities where there must be several foci from which

flies escaping on warm days in March and April survive to produce the hordes that begin to appear late in May.

"The possibility of house flies overwintering in the larva and pupa stages has been demonstrated at Washington, D. C., and at Columbus, Ohio, as well as for the milder regions of Texas. But whether this method of overwintering in these stages or by continued breeding is the more common or more successful can not now be stated. To judge from experiments with larvæ and pupæ, and from the fact that house flies do not appear in large numbers until late in May or early in June, it would seem that only a very small percentage of larvæ which are present in manure heaps in the autumn live through the winter and give rise to the adults in the spring."

A list of 18 references to the literature is included.

On the life history of Sarcophaga eleodis, G. W. BARBER (*Jour. Econ. Ent. 11 (1918), No. 2, p. 268*).—The author records observations at Maxwell, N. Mex., of the larviposition of *S. eleodis* on *Eleodes obsoleta*, followed by the entrance of the larva into its host through the anal opening. "The beetle thus attacked lived for 13 days, dying on September 26, and on September 28 the full grown larva issued, breaking off the head of the host in doing so. On March 12 the larva had entered the pupa stage, from which the adult fly emerged on April 3, 1917."

Notes on some southwestern Buprestidæ, H. E. BURKE (*Jour. Econ. Ent. 11 (1918), No. 2, pp. 209–211*).—This paper gives the host plants and some biological notes on 18 species of flathead borers (buprestid larvæ) mostly from Sabino Canyon, Santa Catalina Mountains, Ariz.

The southern corn rootworm and farm practices to control it, P. LUGINBILL (*U. S. Dept. Agr., Farmers' Bul. 950 (1918), pp. 10, figs. 7*).—A popular summary of information relative to this pest and means for its control. An account of this pest by Webster has been previously noted (E. S. R., 30, p. 561).

Common white grubs, J. J. DAVIS (*U. S. Dept. Agr., Farmers' Bul. 94[illegible] (1918), pp. 28, figs. 21*).—A revision of Farmers' Bulletin 543 (E. S. R., 29, p. 561).

Control of the striped cucumber beetle, H. D. BROWN (*Illinois Sta. Circ. 220 (1918), pp. 4, fig. 1*).—A popular summary of information.

The alfalfa weevil (Phytonomus posticus), H. R. HAGAN (*Utah Sta. Circ. 31 (1918), pp. 8, figs. 10*).—A popular account.

Important clover insects, H. A. GOSSARD (*Mo. Bul. Ohio Sta., 3 (1918), No. 4, pp. 104–106, fig. 1*).—This article, which is the first of several to be issued on the control of clover-feeding insects, gives a popular summary on the clover leaf weevil (*Hypera punctatus*).

The avocado weevil (Heilipus lauri), A. S. HOYT (*Quart. Bul. Plant Bd. Fla., 2 (1918), No. 2, pp. 108–112, figs. 3*).—A brief account in which the importance of this pest is emphasized.

Wintering bees in Tennessee, C. E. BARTHOLOMEW (*Col. Agr. Univ. Tenn. Ext. Dir. Pub. 53 (1917), pp. 8, figs. 5*).—A popular summary of information.

Fertilization of queen bees, C. W. HOWARD and L. V. FRANCE (*Jour. Econ. Ent., 11 (1918), No. 2, pp. 265–267*).—The authors report upon their experiments in the artificial fertilization of queen bees, which indicate that if the mating of queen bees is to be controlled it must be done in some way other than that which they followed.

Important factors in the spread and control of American foul brood, E. D. BALL (*Jour. Econ. Ent., 11 (1918), No. 2, pp. 200–205, fig. 1*).—A discussion, based particularly upon Wisconsin conditions.

Finely powdered mercuric chlorid for the destruction of the Argentine ant (Iridomyrmex humilis), C. W. MALLY (*So. African Jour. Sci., 13 (191[illegible]*

Jour. Econ. Ent., 11, pp. 565–567).—The author has found that a cordon of finely ground corrosive sublimate about 0.5 in. in width placed around the entrance to the nest will result in the destruction of the ants. "When the sublimate has been sprinkled on the soil at any point, it remains sufficiently virulent to affect the ants for a long time. Certain protected spots treated eight or nine months ago still react on the ants when they wander over them. Heavy rains carry the corrosive sublimate away to a very large extent, but light rains simply carry it into the soil, and then, as the moisture evaporates, there is a tendency for the corrosive sublimate to be deposited on the surface, thus reproducing 'ant-tape' conditions. This suggests that it may be possible to treat the foundations of buildings, either during construction or afterwards, with corrosive sublimate in solution, and fortify them against ant invasion."

An emergence response of Trichogramma minutum to light, G. N. Wolcott (*Jour. Econ. Ent., 11 (1918), No. 2, pp. 205–209*).—In work with the sugar-cane borer at Harlingen, Tex., during the summer of 1917, 944 of 1,506 clusters of eggs, or 62.7 per cent, were found to be parasitized by *T. minutum*. The average of 35 experiments shows that 6.19 times as many adults of *T. minutum* emerge in the first hour after being exposed to daylight as emerge in the dark per hour of previous daylight in the same day.

Eupelminus saltator as a parasite of the Hessian fly, W. R. McConnell (*Jour. Econ. Ent., 11 (1918), No. 2, pp. 168–175, fig. 1*).—During the course of studies of parasites of the Hessian fly the author has reared a wingless species as yet unrecorded in American literature, namely, *E. saltator*. An account of studies of this species at Hagerstown, Md., during the season of 1916 are presented.

It is a primary parasite of the Hessian fly, attacking externally both larval and pupal hosts inside the puparium. In the laboratory the average time required for its development varied greatly with the season, the shortest period recorded being 15 days during July. Five generations were reared in the laboratory during 1916 between April and September and a sixth generation overwintered and emerged the following May. While up to the present time *E. saltator* has been of inconsiderable importance in the natural control of the Hessian fly, during the period of observation there has been no extensive outbreak either of the Hessian fly or its alternate host, *Harmolita* (*Isosoma*) spp. It has been reared by the author from nine localities in Pennsylvania, from two in Maryland, and two in Virginia, and by W. J. Phillips from Harmolita material from Michigan, Indiana, Ohio, New York, Pennsylvania, and Virginia.

Note on the development of Trichogramma evanescens, J. B. Gatenby (*Quart. Jour. Micros. Sci. [London], n. ser., 62 (1917), No. 248, pp. 613, 614*).—This consists of corrections of errors in the paper previously noted (E. S. R., 37, p. 856).

Some results of two years' investigations of the Rocky Mountain spotted fever tick in eastern Montana, R. R. Parker (*Jour. Econ. Ent., 11 (1918), No. 2, pp. 189–194*).—In this paper the author considers the abundance of ticks (*Dermacentor venustus*), wild mammals as tick hosts, and relation of the character of the country to the abundance of host animals and of ticks.

The chigger mites affecting man and domestic animals, H. E. Ewing and A. Hartzell (*Jour. Econ. Ent., 11 (1918), No. 2, pp. 256–264, fig. 1*).—The authors find that six separate and distinct mites taken from man and domestic animals have been accurately described, figured, and named, of which three are found in Europe, two in the East Indies, and one in Mexico. In this country at least two distinct chigger mites are known to attack man, but the specific identity remains to be worked out.

FOODS—HUMAN NUTRITION.

Experiments on the digestibility of fish. A. D. HOLMES (*U. S. Dept. Agr. Bul. 649 (1918), pp. 15*).—In the study of the digestibility of the protein and fat supplied by some common varieties, fish in the form of "fish loaf" was served as the major part of a simple mixed diet, which also included potatoes, crackers, fruit, sugar, and tea or coffee. The results are summarized as follows:

Results of digestion experiments with fish.

Number of experiments.	Kind of fish.	Average amount of fish eaten per man per day.	Digestibility of fish protein.	Digestibility of fish fat.
		Grams.	*Per cent.*	*Per cent.*
3	Mackerel	348	93.1	[illegible]
3	Butterfish	471	91.9	[illegible]
8	Grayfish	449	92.8	[illegible]
4	Salmon	355	93.2	[illegible]

"Considering the experiments as a whole, the very complete utilization of the protein and fat supplied by the fishes studied offer additional experimental evidence that fish is a very valuable food and that its extensive use in the diet is especially desirable."

A biological analysis of pellagra-producing diets.—I. The dietary properties of mixtures of maize kernel and bean. E. V. MCCOLLUM and N. SIMMONDS (*Jour. Biol. Chem., 32 (1917), No. 1, pp. 29–61, figs. 2*).—Continuing previous work (E. S. R., 37, pp. 61, 163), the present series of papers describes an inquiry with respect to the several dietary factors of diets consisting of the important food materials (except milk and eggs) in use in the United States. The first paper of the series describes the addition of certain food substances which must be made to combinations of the maize kernel and the navy bean to make these mixtures dietetically complete. The results reached were as follows:

Like each of the two seeds individually the mixtures contain too small an amount of the "fat-soluble A" to induce optimum well-being in growing animals. The mixtures furnish a great abundance of "water-soluble B."

The most satisfactory protein mixture is found in about 80 per cent of maize and 20 per cent of beans. Such a mixture has about one-half the biological value that the total protein mixture in milk possesses.

The deficiencies of the maize and bean mixture consist in its mineral content of calcium and sodium and makes important the addition of milk or of leaves of plants.

Composition of California bean varieties. M. E. JAFFA and F. W. ALLEN (*California Sta. Bul. 294 (1918), pp. 341, 343*).—Analyses of 16 varieties of California beans are reported. The average composition of the seed is reported as follows: Water 9.91 per cent, ash 4.11, protein 20.84, fat 2.25, crude fiber 4.25, and nitrogen-free extract 58.62 per cent. The average composition of the straws was water 11.07 per cent, ash 6.97, protein 5.68, fat 1.52, crude fiber 41.1, and nitrogen-free extract 33.63 per cent; and of the pod, water 10.46 per cent, ash 7.38, protein 4.29, fat 1.15, crude fiber 30.42, and nitrogen-free extract 46.3 per cent.

Wheatless recipes from Washington headquarters (*Hotel Mo., 26 (1918), No. 302, pp. 60–65*).—A collection of wheatless recipes sent out by the Food

administration to the hotel and restaurant keepers who pledged themselves ... no wheat until next harvest.

Use barley—save wheat (*U. S. Dept. Agr., Office Sec. Circ. 111 (1918), pp.* ...). Recipes tested by the Office of Home Economics of the States Relations ... for the use of barley flour in place of wheat flour in quick breads, ..., cakes, and cookies are given.

Use peanut flour to save wheat (*U. S. Dept. Agr., Office Sec. Circ. 110 (...), pp. 4*).—This circular, which is a contribution from the States Relations Service, contains tested recipes for the use of peanut flour made by ... the press cake resulting from the expression of peanut oil.

Use soy-bean flour to save wheat, meat, and fat (*U. S. Dept. Agr., Office ... Circ. 113 (1918), pp. 4*).—"The soy bean press cake, which still contains ... oil and all the rest of the food material originally present in the beans, ... readily ground into flour, which is of high food value and can be used ... many ways in cooking." Recipes, tested by the Office of Home Economics ... States Relations Service, for the use of soy-bean flour are given.

A neglected source of valuable human food.—Cottage cheese can partly ... place meats in human diets, A. E. PERKINS (*Mo. Bul. Ohio Sta., 3 (1918), ... pp. 128–134*).—The desirability of making more cottage cheese from the ... milk and buttermilk on the farm is discussed. The fact that cottage ... can be used in place of meats in human diets is emphasized. It is ... pointed out that the whey from making cottage cheese can be successfully ... for stock feeding in place of the skim milk. Suggestions for making and ... cottage cheese are included.

Cottage cheese dishes (*U. S. Dept. Agr., Office Sec. Circ. 109 (1918), rev. ed., ... 19, figs. 7*).—Recipes for many ways of serving cottage cheese and utilizing ... whey are given.

Savings and savory dishes (*London: A. & C. Black, Ltd., 1917, pp. 139*).—... collection of pamphlets issued originally by the Patriotic Food League of ... land. These pamphlets are designed to give hints on household economy in ... matters relating to food with particular reference to war conditions. ... and recipes are included.

[Miscellaneous food and drug topics], E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul., 5 (1918), No. 2, pp. 21, 27–36*).—A report of ... foods, beverages, and drugs recently analyzed is discussed.

Food surveys (*U. S. Dept. Agr., Bur. Markets, Food Surveys, 1 (1918), No. ... 7*).—This, the initial number of this periodical, reports data as to the ... surveys carried on by the Bureau of Markets and indicates the commercial ... of important grains and grain food products in the United States on ... 1. The data relates to the stocks in elevators and grain warehouses, ... warehouses, grain mills, and those in the hands of wholesale grain ... .

The commercial stocks of wheat on April 1, 1918, were apparently only 37.9 ... cent of those on April 1, 1917, while those of white wheat flour were 82.9 ... cent. With the exceptions of oats and buckwheat flour the stocks of the ... commodities show considerable increase.

Diet standards for hard work: Supplementary rations (*Lancet [London], ... I, No. 12, pp. 443, 444*).—It is announced that the British Ministry of ... has decided to issue supplementary rations for all persons classed as ... workers, i. e., those engaged in heavy industrial or agricultural work. ... scheme does not provide an increase in the allowance of butcher's meat, ... a supplementary ration, for which cards will be issued, limited to bacon, ..., poultry, and meat other than butcher's meat. "The increased allowance will amount approximately to an advance of 50 per cent on the ration

upon which the supply of meat food to the population of London and neighboring counties is now based. . . . A limited number of women will share the same extra allowance of food provided their work is more strenuous than that implied by 'ordinary' factory work not involving exceptional physical exertion or exposure to heat or weather. . . . Professional workers are excluded from the scheme whatever the strain upon their actual muscular powers."

ANIMAL PRODUCTION.

The rural efficiency guide.—IV, Stock book, G. C. HUMPHREY (*Cleveland, Ohio: The Peoples' Efficiency Pub. Co., 1918, pp. [IX]+448, pls. 4, figs. 332*).—This volume deals with the following subjects: Live stock breeding and management (pp. 1–5), cattle production (pp. 7–60), diseases of cattle and treatment (pp. 61–100), horse production (pp. 101–138), diseases of horses and treatment (pp. 139–181), sheep production (pp. 183–199), diseases of sheep and treatment (pp. 200–212), swine production (pp. 213–233), and diseases of swine and treatment (pp. 234–272); includes a section, by Florence Forbes, on poultry raising, and diseases and treatment (pp. 273–402); and gives miscellaneous information of interest to stock breeders.

Proceedings of the Cut-over Land Conference of the South (*Proceedings Cut-over Land Conf. South, 1917, pp. 244*).—At this meeting, held in New Orleans April 11–13, 1917, the employment of live stock as a very important factor in utilizing and building up the cut-over pine lands of the South was emphasized. Papers bearing especially on this phase of the subject are as follows: Experiences in Cattle Raising on Cut-over Lands, by F. B. Enochs (pp. 93–96); Beef Cattle and Hogs, by G. M. Rommel (pp. 112–125); A Survey of the Live-stock Situation, by A. M. Soule (pp. 125–141); The Animal Industry of the South: Past, Present, and Future, by W. H. Dalrymple (pp. 142–150); Demonstration Work on Cut-over Lands, by G. E. Nesom (pp. 157–168); The Dairy Industry of the South, by C. W. Radway (pp. 174–178); Some Suggestions for Dairying on Cut-over Lands, by N. P. Hull (pp. 179–181); Tick Eradication, by E. I. Sm[illegible] (pp. 182–187); The Sheep Industry of the South, by F. R. Marshall [illegible] 196–201); and Forestry and Cattle Raising on the Cut-over Pine Lands of the Southern States, by J. G. Lee (pp. 217–225).

Proceedings of the Farmers' Annual Normal Institute and spring meeting of the State Board of Agriculture, compiled by C. [illegible]E. CAROTHERS (*Pennsylvania Dept. Agr. Bul. 360 (1917), pp. 205*).—Among others, papers were presented on the following subjects: Selecting Heavy Laying Hens by External Characters, by W. T. Wittman (pp. 68–72); Beef Production in Pennsylvania, by J. C. Minkler [illegible] Herr (pp. 76–78); and Problems in Pork Production, by F. [illegible] (pp. 89–106).

Receipts and shipments of live stock at the Kansas City stock yards for the year 1917 with summary for the years 1871 to 1917 (*Ann. Live Stock Rpt., Kansas City Stock Yds., 1917, pp. 31*).—The receipts of cattle [illegible] year were the largest in the history of the yards, namely, 2,640,145 head. The record was also broken for horses and mules, the number received being 127,[illegible] head. There was a large increase in the number of calves received over the year 1916 and a decrease in the number of hogs and sheep.

The live stock situation from the marketing standpoint, H. S. ARKELL (*Ontario Dept. Agr. Bul. 246 (1917), pp. 21–23*).—Attention is called to the importance of the live-stock industry to the Dominion of Canada and the large increase in exports during the last four years. Of the total of $372,394,38[illegible] agricultural produce exported in the fiscal year ended March 31, 1916, animal produce contributed $105,919,190.

Survey and census of cattle in Bengal: A review (*Agr. Jour. India, 12 (1917), No. 4, pp. 593-598*).—A discussion of the kinds and characteristics of the cattle of the various districts of Bengal. The total number of cattle is given as 25,355,838 head, of which number 944,633 are buffaloes.

Louisiana lespedeza hay v. western timothy hay, W. H. DALRYMPLE (*Baton Rouge, La.: H. D. Wilson, [1917], pp. 7*).—By a comparison of chemical analyses and coefficients of digestibility of lespedeza hay and timothy hay figures are drawn of the two forages. Planters are urged to produce, sell, and use the home-grown lespedeza hay instead of the more expensive western timothy hay.

The value of cider apples and pomace as foods for farm stock, B. T. P. BARKER and B. N. WALE (*Univ. Bristol, Ann. Rpt. Agr. and Hort. Research Sta., 1916, pp. 78-80*).—A preliminary account is given of feeding apple pomace to pigs. The results indicate that for pigs of from 55 to 60 lbs. neither the apples nor pomace gave as satisfactory increase when fed with meals as did the meals alone. For older pigs the results were more favorable.

Two analyses of apple pomace are given.

The use of the horse chestnut as a feed for animals, DECHAMBRE (*Compt. Rend. Acad. Agr. France, 3 (1917), No. 32, pp. 926-940*).—A compilation of work done with the horse chestnut in determining its feeding value and methods of preparation to make it palatable. Tables of analyses and coefficients of digestibility are incorporated.

Cause and prevention of rancidity in palm nut kernel cake, R. B. CALDER (*Jour. Agr. Sci. [England], 7 (1916), No. 4, pp. 470-472*).—The experiments reported show that the rancidity of palm nut kernel cake is due to the action of a lipase set free from a zymogen present in the seed under the influence of warmth and moisture. If the cake is heated the zymogen is usually destroyed. If the cake is kept dry and cool it remains sweet. If kept moist and warm it becomes rancid in a few days from the action of the lipase which splits the fats or oils, forming rancid fatty acids. The lipase can be destroyed by heating the moistened cake to 70° C. for a short time.

Modern ensilage practice, A. W. OLDERSHAW (*Trans. Highland and Agr. Soc. Scot., 5. ser., 29 (1917), pp. 68-86, figs. 3*).—A discussion of the feasibility of the silo in farm practice in England and Scotland. A history of the efforts to make silage in Great Britain is detailed, with suggestions as to types of silos and kinds of forage available. At the present time there are 40 silos in East Anglia with indications that this number will be increased.

Making and feeding silage, E. W. SHEETS (*W. Va. Univ. Agr. Ext. Dept. Circ. 154 (1917), pp. 16, figs. 3*).—The making of silage is described and the feeding to different classes of live stock is discussed and rations suggested.

Roughages and roots, G. E. BROWN (*Breeders' Gaz., 73 (1918), No. 6, p. [illegible]*).—A method of conserving feed in Montana is described. Large barns [illegible]ly covered are built and the alfalfa when cut is put in with layers of [illegible]. The juices of the fresh alfalfa are absorbed by the straw and the [illegible] keeps well. When fed the mixture is passed through a machine and cut, and is readily consumed without waste.

[illegible] author describes a method he himself followed with much success, [illegible]ly in fitting horses for exhibition. Steamed mangels were put into a [illegible]le hot and mixed with cut hay, oats, and bran. The box was covered [illegible]t to steam over night, the mixture being still warm the next morning.

[illegible] stuff analyses (*Md. Agr. Col. Quart., Nos. 72 (1916), pp. 15; 76 (1917), [illegible]*).—A list of feeds and analyses of samples obtained from January to [illegible]916, and from June, 1916, to May, 1917, inclusive, are given. The

materials were, as a rule, proprietary by-products from the manufacture of oils, alcohol, whisky, beer, breakfast foods, etc., or mixtures of them with refuse molasses, but also included meat meal and tankage, brewers' and distillers' grains, cottonseed meal, linseed meal, dried beef pulp, alfalfa meal, gluten feed, and corn oil meal. The examination of wheat bran, middlings, corn meal, and similar feeds was limited in most cases to a microscopical test for adulterants.

Commercial feeding stuffs and registrations for 1917, C. S. CATHCART ET AL. (*New Jersey Stas. Bul. 311 (1917), pp. 5–100*).—Results are given of the inspection of feeding stuffs in the State during the year 1917, including tabulated analyses of the following feeding stuffs: Alfalfa meal, blood meal, brewers' dried grains, buckwheat middlings, buckwheat offal, coconut meal, cottonseed feed, cottonseed meal, corn bran, corn feed meal, gluten feed, gluten meal, corn oil cake meal, corn and cob meal, distillers' dried grains, dried beet pulp, feeding flour, fish scrap, hominy meal and feed, linseed meal, malt sprouts, meat scrap, oat hulls, peanut meal, rye bran, rye middlings, shredded wheat waste, vegetable tankage, wheat bran, wheat middlings, and mixed and proprietary feeds. Of the 1,103 samples examined 10 per cent were deficient in protein and 9.3 per cent in fat. A list of manufacturers who registered feeding stuffs for sale in 1917 is appended.

Feeding stuffs report, 1916, J. W. KELLOGG (*Penn. Dept. Agr. Bul. 24 (1917), pp. 269*).—During the year samples collected for inspection totaled 1,148, while 263 special samples were sent in for analysis. The number of deficiencies increased somewhat over 1915, especially with cottonseed meals. The poultry feeds showed improvement with a smaller incorporation of weed seeds. Several of the proprietary feeds carrying molasses were found to be moldy. The gross adulterations were few in number.

Analytical results and microscopical examinations reported covered the following: Oil-cake meals, distillery and brewery by-products, maize by-products, wheat offals, rye offals, wheat and rye offals, oat by-products, buckwheat offals, alfalfa meal, dried beet pulp, proprietary and miscellaneous mixed feeds, animal by-products, and condimental stock and poultry feeds.

Feeding stuffs report, G. G. HUTCHISON (*Penn. Dept. Agr. Bul. 290 (1917), pp. 80–100*).—A report on the feeding stuffs trade and control read at the fortieth annual meeting of the Pennsylvania State Board of Agriculture at Harrisburg, Pa., January 23 and 24, 1917.

Basal katabolism of cattle and other species, H. P. ARMSBY, J. A. FRIES, and W. W. BRAMAN (*Jour. Agr. Research [U. S.], 13 (1918), No. 1, pp. 1–36, figs. 8*).—The work here reported is a part of cooperative investigations between the Bureau of Animal Industry of the U. S. Department of Agriculture and the Institute of Animal Nutrition of the Pennsylvania State College. The authors state that the term "basal katabolism" is generally accepted as a convenient designation for that portion of the katabolism due to the fundamental vital processes as distinguished, on the one hand, from that arising from external muscular activities and, on the other hand, from that caused by the ingestion of food. It is the katabolism of the animal in a state of complete muscular rest and with the processes of digestion and resorption suspended.

Results are given of 27 determinations of the daily basal katabolism of unfattened cattle of different weights and ages. These results are compared with those secured by other workers with man, cattle, swine, and horses.

The basal katabolism, whether computed lying or standing or for an equal proportion of each, was found to be equally well correlated with the estimated

body surface and with the live weight. The basal katabolism per unit of body surface showed considerable variability and a positive correlation with the live weight. The mean computed 24-hours basal katabolism per square meter of body surface was 904±24 calories for cattle lying, 1,173±21.4 calories for cattle standing 12 hours and lying 12 hours, and 1,365±25.7 calories for cattle standing 24 hours.

"The mean daily basal katabolism per square meter of body surface appears not to differ greatly in man, cattle, swine, and horse under comparable conditions."

A list of the literature cited is appended.

The mathematical valuation of feeds in animal production, T. PFEIFFER (*Landw. Vers. Stat.*, 87 (*1915*), *No. 6, pp. 409–447, figs. 3*).—The author shows by a comparison of estimated values of feeds with those from the results of experiment that the former are not complete or mathematically correct or absolute, but are subject to changes and corrections. The calculation of food values may be ultimately nearer exactness, but it will always be subject to corrections. There are not enough data at present upon which to base changes in tables of values, but they can only be considered at this time as guides that are not always borne out in practice. Only by further research can we perfect the tables of food values that we now have and find means of unifying and stabilizing them.

The calculation of the values of the components of feeds, A. STIELTJES (*Industr. Lait. [Paris]*, *42* (*1917*), *No. 9, pp. 117–119*).—In comparison with the method of the calculation of food values as given by Kellner there is shown the advocated in France and England. In this method the protein and fat established are multiplied by 2.5 and added to the carbohydrate.

Suggestions on feeding stock, G. E. DAY (*Ontario Dept. Agr. Bul. 246* (*1917*), *pp. 3–20*).—Despite the high prices of feeds, farmers are advised to continue stock feeding for reasons given, showing this to be the better practice even during the present emergency. A description and valuation of various available feeds are given.

The utilization of fatty acids for feeding purposes, A. LAUDER and T. W. FAGAN (*Jour. Soc. Chem. Indus.*, *36* (*1917*), *No. 20, pp. 1069–1071*).—The manufacture of glycerin for explosives during the last three years has left as a by-product large amounts of fatty acids. For the utilization of this material feeding to live stock has been suggested.

To determine the value of fatty acids as a feed, those from coconut oil were tested for trial. Two lots of five pigs each were fed equal parts of corn meal and middlings and green feed. In the grain ration of the second lot about 5 per cent was replaced by the fatty acids. The experiment was continued for four weeks. The pigs in the second lot ate the mixture readily and apparently made as satisfactory gains as those in the first lot.

In another and more accurate experiment 10 newly weaned pigs averaging 27.5 lbs. each were divided into two lots and fed from May 7 to July 19. Lot 1 received in the beginning 6.25 lbs. of the meals daily, which was gradually increased to 12 lbs. at the close of the experiment, and lot 2 received 5.25 lbs. of the meals daily, increased gradually to 10 lbs. at the close of the experiment. In addition lot 2 received 5 oz. of fatty acids in the beginning, which was increased gradually to 9.5 oz. at the close of the experiment. Lot 1 made a total gain of 145.5 lbs. and lot 2, 143 lbs.

As the amount of the rations was kept low while the gains were nearly equal, it would appear that the fatty acids were assimilated.

[Feeding and grazing experiments with pigs and cows], F. B. Headley (*U. S. Dept. Agr., Bur. Plant Indus., Work Truckee-Carson Expt. Farm, 1916, pp. 13–17*).—In a cooperative experiment under farm conditions 34 pigs gained 950 lbs. live weight in 21 days on 1.25 acres of a mixture of field peas and wheat. With pork at 7 cts. per pound, the value of the gain was $33.20 per acre. No additional feed was given during the grazing period.

Sufficient feed for 2 cows from April 28 to August 15, and a third cow from June 15 to August 1, was furnished by 1.25 acres of sweet clover. No bloating occurred, but the cows did not stay in the best of condition. Pigs failed to make satisfactory gains on sweet clover pasture, although they seemed to eat the sweet clover readily.

One plat of 0.25 acre of alfalfa furnished grazing for 10 9-week-old pigs from May 13 to the latter part of August. On September 9, 4 of the pigs were removed and the 6 remaining pigs were grazed for 14 days longer. A 2 per cent ration of barley was fed throughout the experiment. There was a total gain of 2,788 lbs. per acre during the 152 days, 2.37 lbs. of barley being fed per pound of gain. Valuing pork at 7 cts. and barley at 1.5 cts. per pound, there was a net return of $96.16 per acre. Another plat of 0.53 acre of alfalfa of inferior growth, supplemented with a 2 per cent ration of barley, produced 1,821 lbs. of pork from May 13 to September 23, 1916. In this test the pigs ate 2.36 lbs. of barley per pound of gain and returned $63.10 per acre for the alfalfa. At the close of the alfalfa pasture experiments some of the pigs were placed in dry lot and fed alfalfa hay and barley. A 3 per cent ration of barley was fed from September 30 to October 24, a 3.5 per cent ration of barley from October 24 to November 16, and an unlimited supply of barley from November 16 to December 2, when they were sold. During the 63 days the pigs increased in weight from 1,117 to 1,805 lbs. Although the percentage of daily gain was materially increased by feeding an unlimited ration, the amount of barley required to produce a pound of gain was unchanged, the average for the entire period being 4.6 lbs. In this test the cost of the barley at 1.5 cts. per pound was practically equal to the value of the gain at 7 cts. per pound.

Rice hulls as a feed for work cattle, A. Pirocchi (*Ann. Ist. Agr. [Milan], 13 (1915–16), pp. 107–121*).—Favorable results are reported in feeding rice hulls with hay to cattle.

Silages for fattening steers, H. K. Gayle and E. R. Lloyd (*Mississippi Sta. Bul. 182 (1917), pp. 15, fig. 1*).—Results are given of feeding experiments with steers during two winters for the purpose of comparing silages made from (1) Goliad corn, (2) Early Amber sorghum, (3) equal parts of cowpeas and Johnson grass, (4) corn stover, (5) Texas Seeded ribbon cane, (6) equal parts of Goliad corn and Early Amber sorghum, and (7) equal parts of Goliad corn and Mammoth Yellow soy beans. As a basis for comparing the silages with a dry roughage, cottonseed hulls were fed to one lot of steers. On lands of equal fertility these silage crops varied in yield from 3.6 tons for cowpeas to 15.25 tons for Texas Seeded ribbon cane. The cost per ton of crops put into the silo varied from $1.26 for Texas Seeded ribbon cane to $2.93 for cowpeas.

The steers in lots 1 to 5, inclusive, used the first winter averaged about 500 lbs. each; and those in lots 6 to 9, inclusive, used the second winter averaged about 750 lbs. each. They were fed in an open shed. Lots 1 to 5, received cottonseed meal as a sole concentrate; and lots 6 to 9, cottonseed meal and corn and cob meal (2:1) for the first two weeks and cottonseed meal thereafter. During the first winter the steers were fed 137 days, the average daily ration per steer being 6.5 lbs. of cottonseed meal and in addition 45.32 lbs. of silage for

to 1 to 4, and 27.15 lbs. of cottonseed hulls for lot 5. The average daily ins per head were 1.78 lbs. for lot 1; 1.58 lbs. for lot 2; 1.31 lbs. for lot 3; 67 lb. for lot 4; and 1.58 lbs. for lot 5. The steers were fed 92 days during e second winter, the average daily ration, after the corn and cob meal period, ing 5 lbs. of cottonseed meal and about 40 lbs. of silage. The average ily gains per steer were 1.52 lbs. for lot 6; 1.36 lbs. for lot 7; 1.72 lbs. for 8; and 1.88 lbs. for lot 9. Based on the roughage required per pound of in, it is noted that when the steers were fed 137 days, 1 lb. of Goliad corn lage was equivalent to 1.124 lbs. of Early Amber sorghum silage; 1.355 lbs. cowpea and Johnson grass silage; 2.732 lbs. of corn stover silage or 0.663 lb. cottonseed hulls. When the steers were fed 92 days, 1 lb. of Goliad corn lage was equivalent to 1.134 lbs. of Texas Seeded ribbon cane; 0.903 lb. of ual parts of a mixture of Goliad corn and Early Amber sorghum silage, or 83 lb. of equal parts of a mixture of Goliad corn and Mammoth Yellow soy an silage. The costs per pound of gain varied from 8.37 cts. for lot 8 to 84 cts. for lot 4.

In the second part of the bulletin the nutrients furnished by each ration e correlated with the gains made by the steers on the various rations. abulated data show the results of the chemical analyses of the feeds and the trients consumed per pound of gain. Using Kellner's estimate of a maintee ration and the coefficients of digestibility drawn from Henry and Mors's tables, the authors construct a table which shows the total digestible trients required for each lot for maintenance for the time fed, and the gestible nutrients required per pound of gain from each ration over and above at required for maintenance.

Baby beef and calf feeding, H. K. GAYLE (*Mississippi Sta. Bul. 183 (1917)*, 35, *figs. 3*).—Previously noted from another source (E. S. R., 39, p. 169).

Raising calves with modified skim milk, R. GIULIANI (*Ann. Ist. Agr. Milan*], *13 (1915–16), pp. 123–146, figs. 4*).—The author reports the successful bstitution of skim milk for whole milk in calf feeding by incorporating in the rmer oleomargarin and starch with levulose. The young calf is gradually anged from whole milk to the substitute. The physiological effects are said to good, while more economical results are obtained.

Breeding experiments with Welsh mountain ewes for the production of t lambs (*Univ. Col. N. Wales, Bangor, Dept. Agr. [Pubs.] 4 (1914), pp. 8; (1915), pp. 3–5*).—The results are given of breeding mountain grade ewes in ts of 25 each in Southdown, Hampshire, Romney Marsh, and Wensleydale ns.

In two years' work the Southdown cross lambs averaged 8 lbs. less in weight hen sold. They are, however, held in higher esteem by the butchers and adily become fat at any age under most lowland conditions. To give equal turns with the others it is necessary that they bring 0.5d (1 ct.) a pound more, re weight. In many local markets they do this. The Hampshire cross came xt to the Southdown. The Romney Marsh and Wensleydale crosses were not sirable for early fat lambs, though for fattening the following winter they uld be recommended.

During 1913–14 and 1914–15 similar experiments were carried out using outhdown, Wiltshire, Ryeland, and Border Leicester rams. From the two ars' results the greatest weights were made by the Border Leicester cross, d they also matured early. Another advantage was a heavy fleece, which is sirable if the lambs are carried over. The proportion of carcass weight to live eight was again very favorable to the Southdown cross. For markets, how-

ever, that do not appreciate the quality of the Southdown to the extent of paying a higher price, the Leicester cross may be recommended.

Feeding lambs for the block, E. S. ARCHIBALD (*Canada Dept. Farms Pamphlet 16 [1917], pp. 4*).—Attention is called to the favorable outlook in lamb feeding at the present time. While the proper time to sell lambs is when they are finished, they should be selected out and uniform lots sold, the lighter ones being held for further feeding. Again, most Canadian lambs are sold in the fall and a better distribution would tend to maintain prices.

From a summary of the work of the experimental farms of the Dominion the profits from the winter finishing of lambs are estimated to have ranged from 25 cts. to $3.82 per head. Suggestions are made as follows: All of the best ewe lambs and selected pure-bred ram lambs should be kept for breeding. Grass is the ideal ration for sheep. Alfalfa is placed first of the dry roughages, followed by clover hays and mixed hays. Of the succulent roughages corn silage when costing not over $2 per ton, is the cheapest and best for lambs. Turnips are safer than mangels. A mixture of grain feeds is best. Mill feeds can often be profitably used as a part of the ration, but those finely ground and of a pasty nature should be avoided.

While local supplies and prices should govern, it is suggested that generally it will not pay to exceed 1.25 lbs. of grain per lamb at the finish or 5 lbs. of succulent roughage and from 3 to 5 lbs. of dry roughage.

Mating sows before their litters are weaned. Late spring and early fall farrowing possible, W. L. ROBISON (*Mo. Bul. Ohio Sta., 3 (1918), No. 5, pp. 141–143*).—Results are given on the four seasons' experience in reference to the possibility of breeding sows prior to the time the pigs are weaned and while the pigs are comparatively young. The method followed is to separate the sows and pigs each night. Usually after the sows have been kept away from their pigs over night for four or five successive times œstruation occurs. In some instances a longer time was necessary, but in only one case did the plan fail. The indications are that sows will come in heat almost or quite as readily under this treatment as when their pigs are entirely weaned before the sows are bred.

The advantages of breeding during lactation are pointed out.

The feeding and management of swine, J. M. HUNTER (*New Jersey Sta. Circ. 90 (1917), pp. 43, figs. 16*).—This is a treatise on the feeding, care, and management of swine under New Jersey conditions.

The swine industry in Colorado, W. T. WASEL and G. E. MORTON (*Denver Colo. Bd. Immigration, [1917], pp. 11–13*).—Conditions for increased hog production in Colorado are noted. A greater employment of hogs on the farms for utilizing waste products and adding to income is urged.

Substitutes for oats in feeding horses, R. GIULIANI (*Gior. Med. Vet., 68 (1917), No. 12, pp. 265–278*).—A résumé of work in various countries in lessening the cost of maintenance in keeping horses. The feeding value of oats and the local price is compared with that of other available feeds.

What steps should be taken in England and Wales to secure an adequate supply of horses suitable for military purposes? (*Bd. Agr. and Fisheries [London], Rpt. Com. Supply Horses Mil. Purposes, 1915, pp. 26*).—The committee recommended, among other things, the compulsory registration annually of all stallions used, an increase in premiums offered for stallions, the placing by the Government of selected mares in the hands of selected breeders, the purchase by the Government of stallions for country service, the award of prizes for brood mares and foals, an annual census of horses, together with those

...ported and exported, and the services of an advisory council, county commissioners, and an expert staff of supervisors.

Feeding experiments with laying hens, W. J. Buss (*Ohio Sta. Bul. 322 (1918), pp. 199–241, figs. 4*).—Experiments reported upon range v. confinement, variety v. simple rations, and various amounts of protein in rations are in continuation of those already noted (E. S. R., 35, p. 171), while the experiments upon different methods of feeding, egg production of early, medium, and late hatched pullets, and a comparison of corn and wheat for hens represent new lines of work.

The following table summarizes the results of four experiments conducted to compare the egg production of hens kept in close confinement with that of hens allowed free range:

Range v. confinement for laying hens.

Year.	Condition.	Duration.	Average number in lot.	Mortality.	Gain or loss (−) in weight per hen.	Cost of feed per hen.	Eggs per hen.	Cost of feed per dozen eggs.	Value of eggs less cost of feed per hen.
		Days.		*Per ct.*	*Pounds.*			*Cents.*	
	Confined (1915–16)	364	39.82	18.2	0.14	$1.34	100.2	16.0	$1.09
	On range (1915–16)	364	43.51	22.0	.06	1.37	115.7	14.2	1.47
	Confined (1916–17)	364	43.76	18.4	− .09	1.31	91.3	17.2	0.88
	On range (1916–17)	364	43.17	26.0	.01	1.32	101.5	15.6	1.13
	Confined	336	72.88	17.7	− .04	1.13	72.6	18.7	0.61
	On range	336	72.50	34.2	.05	1.10	111.5	11.9	1.57

The earlier experiment on the necessity for a large variety of feeds for laying hens was continued, and one lot was added to test the relative efficiency of meat scrap and feeding tankage as sources of protein for laying hens. All the lots were fed shelled corn, and in addition lot 1 was fed a mash of ground corn and meat scrap (8:5); lot 2, a mash of ground corn, bran, and meat scrap (7:3:5); lot 3, wheat and oats (2:1) and a mash of ground corn, bran, middlings, linseed meal, and meat scrap (4:4:4:1:3); and lot 4, a mash of ground corn, bran, and tankage (7:3:4). The experiment lasted 728 days. Some of the results are summarized in the following table:

Variety and simple rations for laying hens.

Lot.	Average number in lot.	Mortality.	Gain in weight per hen.	Grain and mash consumed per hen.	Eggs produced per hen.	Feed consumed per dozen eggs.	Value of eggs less cost of feed per hen.
		Per cent.	*Pound.*	*Pounds.*		*Pounds.*	
1	28.13	10.0	0.17	119.15	241.3	5.92	$3.23
2	27.10	23.3	.04	118.67	242.6	5.87	3.32
3	25.80	23.3	.09	131.49	261.3	6.04	3.47
4	27.98	13.3	.11	117.88	240.9	5.87	3.40

Rations containing approximately 10, 15, and 20 per cent of crude protein were further compared as food for laying hens, the test being carried on for 308 days with White Leghorn hens, 224 days with Barred Plymouth Rock hens, and 384 days with White Leghorn pullets. As in the previous year, the rations were made up of shelled corn and wheat (3:1) and a mash of ground corn, bran, and meat scrap, in the following proportions: Lot 1, 11:3:1; lot 2,

6:3:6; and lot 3, 1:3:11. Some of the results are given in the following table:

Rations of different protein content for laying hens.

Lot.	Protein content of ration.	Breed.	Average number in lot.	Mortality.	Gain or loss (−) in weight per hen.	Grain and mash consumed per hen.	Eggs produced per hen.	Feed consumed per dozen eggs.	Value of eggs less cost of feed per hen.
				Per ct.	*Pound.*	*Pounds.*		*Pounds.*	
1	10	Barred Plymouth Rocks	33.62	28.6	0.22	47.89	61.4	9.35	$
2	15	do	37.17	27.9	.32	49.15	63.6	9.27	
3	20	do	37.36	10.3	−.18	44.51	48.5	11.00	
1	10	White Leghorns	50.02	16.4	−.17	46.80	83.5	6.72	
2	15	do	49.81	9.6	.11	50.01	93.6	6.41	1
3	20	do	54.41	5.4	−.01	46.71	77.1	7.27	
1	10	White Leghorn pullets	58.58	6.7	.32	58.19	93.6	7.46	1
2	15	do	58.18	15.0	.28	64.40	139.6	5.54	
3	20	do	55.66	16.7	.06	63.56	128.5	5.94	1

In testing methods of feeding an experiment was run for 728 days from December 16, 1915, using six lots of 30 White Leghorn pullets each. Lots 1, 2, and 3 were fed a grain mixture of corn, wheat, and oats (3:2:1) and a mash of ground corn, bran, middlings, linseed meal, and meat scrap (4:4:4:1:3); lot 4, no grain and the above mash; lot 5, the above grain mixture and meat scrap; and lot 6, a different ration each four weeks, made up of the above feeds. Lots 1 and 6 were fed the grain in litter and the mash dry in hopper; lot 2, grain in trough and mash dry in hopper; lot 3, grain in litter and mash moist once daily in trough; lot 4, mash dry in hopper; and lot 5, grain in litter and meat scrap once daily in trough. The following table summarizes the results:

Effect of different methods of feeding pullets.

Lot.	Average number in lot.	Mortality.	Gain or loss (−) in weight per hen.	Grain and mash consumed per hen.	Eggs produced per hen.	Feed consumed per dozen eggs.	Value of eggs less cost of feed per hen.
		Per cent.	*Pound.*	*Pounds.*		*Pounds.*	
1	28.77	16.7	0.03	130.06	250.6	6.23	$3.20
2	28.70	3.3	.12	125.02	249.6	6.01	3.2
3	30.00		−.06	127.27	256.2	5.96	3.4
4	27.66	20.0	.05	122.89	246.8	5.97	3.4
5	27.24	26.7	.28	116.62	228.9	6.12	3.1
6	26.78	16.7	.16	122.67	255.2	5.77	3.4

In the experiment to test the effects of different dates of hatching upon the number, value, and feed cost of eggs produced by White Leghorn pullets, each lot of pullets was placed on test when egg production began and taken off when egg production ceased after the first year's production. The pullets in lot 1 were hatched February 22 and began laying August 10, those in lot 2 were hatched April 20 and began laying November 2, while those in lot 3 were hatched June 13 and began laying December 28. The rations consisted of shelled corn and wheat (3:1) and a mash of ground corn, bran, and meat scrap (2:1:2). Some of the results are summarized in the table following.

Egg production of pullets hatched at different dates.

Lot.	Duration.	Average number in lot.	Mortality.	Gain or loss (−) in weight per pullet.	Grain and mash consumed per pullet.	Eggs produced per pullet.	Feed consumed per dozen eggs.	Value of eggs less cost of feed per pullet.
	Days.		*Per ct.*	*Pound.*	*Pounds.*		*Pounds.*	
	448	29.01	6.7	0.04	83.55	166.9	6.01	$2.22
	392	28.36	10.0	.15	75.69	156.4	5.81	2.16
	336	29.50	3.3	−.08	60.61	144.0	5.05	2.11

In order to see if wheat can be replaced by corn in rations for laying hens, experiment was conducted with two lots of 50 White Leghorn pullets each for 4 days beginning October 31, 1915. These pullets were fed a mash of ground n, bran, meat scrap, and linseed meal (4:2:2:1), and in addition lot 1 was shelled corn and lot 2 wheat. The mortality in lot 1 was 8 per cent and lot 2, 52 per cent. Lot 1 produced an average of 89.5 eggs per pullet and sumed 7.7 lbs. of feed per dozen eggs, while lot 2 laid an average of 95.7 gs each and consumed 7.26 lbs. of feed per dozen eggs. The value of eggs r cost of feed per pullet was $1 for lot 1 and 69 cts. for lot 2. In another st comparing wheat and corn, four lots of 50 White Leghorn pullets each re fed for 364 days from November 26, 1916. The grain ration consisted of cracked corn for lot 1, shelled corn and wheat 2:1 for lot 2 and 1:2 for lot 3, and wheat for lot 4. The mash was made up of bran, meat scrap, and linseed meal (2:2:1), and in addition 4 parts of ground corn for lot 1, 4 parts of ground wheat for lot 4, and 4 parts of a mixture of ground corn and ground wheat 2:1 for lot 2 and 1:2 for lot 3. Beginning May 13, 1917, lot 4 was fed the same ration as lot 1. The following table gives the results obtained during the two periods November 26, 1916, to May 12, 1917, and May 13 to November 24, 1917:

Corn v. wheat for laying pullets.

Lot.	Period.	Average number in lot.	Mortality.	Gain or loss (−) in weight per pullet.	Grain and mash consumed per pullet.	Eggs produced per pullet.	Feed consumed per dozen eggs.	Value of eggs less cost of feed per pullet.
	Days.		*Per cent.*	*Pound.*	*Pounds.*		*Pounds.*	
	168	50.00	.....	0.04	26.65	56.9	5.62	$0.91
	168	49.80	2.0	.12	27.91	57.1	5.87	.81
	168	49.96	2.0	.20	27.67	57.7	5.75	.77
	168	44.33	42.0	.16	25.59	35.9	8.56	.23
	196	49.54	4.0	.34	27.53	41.4	7.97	.45
	196	48.46	4.1	.22	27.52	32.5	10.16	.13
	196	47.02	14.3	−.02	25.45	28.6	10.67	.03
	196	28.03	3.4	.50	26.09	32.0	9.77	.25

Data secured with a flock of 200 White Leghorn hens at the Clermont County periment farm are appended. These hens were housed in a single building d had access to practically unlimited range. From October 28, 1915, to tober 25, 1916, they laid an average of 133.4 eggs per hen, the value of which, ss the cost of feed, was $2. From October 26, 1916, to October 5, 1917, the ens laid an average of 103.5 eggs each, the value of which, less cost of feed, as $1.17.

A wheatless ration for the rapid increase of flesh on young chickens, MARY E. PENNINGTON, H. A. MCALEER, A. D. GREENLEE, ET AL. (*U. S. Dept.*

Agr. Bul. 657 (1918), pp. 12, pl. 1).—A comparison is reported of the three following rations for the coop feeding of young chickens for market by commercial feeders: (A) Corn meal 100 lbs. and water 127 lbs., (B) corn meal 100 lbs. and buttermilk 150 lbs., and (C) corn meal 75 lbs., dried distillers' grains 25 lbs., and buttermilk 150 lbs. The chickens used in the tests were of the class known as broilers and varied in weight from 0.75 lb. to 2.5 lbs., with an average of 1.7 lbs. Each lot consisted of 100 chickens, and all the birds were fed for 14 days. Some of the results obtained are summarized in the following table:

Rations for commercial or coop fleshing of young chickens.

Ration	Weight per 100 birds.		Increase in live weight.	Birds making gains in live weight.	Feed consumed, including water.		Total shrinkage in killing, dressing, and chilling.	Edible portion of chilled weight.
	Initial.	Final.			Per 100 birds.	Per pound of gain.		
	Pounds.	*Pounds.*	*Per cent.*	*Per cent.*	*Pounds.*	*Pounds.*	*Per cent.*	*Per cent.*
A	172.1	180.7	5.00	79.03	377.7	43.91	10.46	32
B	169.7	221.3	30.41	95.97	457.9	8.88	10.67	33
C	171.1	231.0	35.01	96.75	473.6	7.91	10.92	33

The amount of feed required per pound of gain for ration B was 8.21 lbs. during the first 4 days of the feeding period, 8.35 lbs. during the first 8 days, and 8.49 lbs. during the first 11 days. For ration C the feed required per pound of gain during the above periods was 7.69, 7.9, and 7.76 lbs., respectively.

In these tests the best results were obtained with birds having an initial live weight of 2 lbs. or less. The economic advantage of fleshing broilers at the packing house is briefly discussed.

Analyses are given of the feeds used.

Home-grown crops for the poultry flock, V. G. Aubry (*New Jersey Sta. Hints to Poultrymen, 6 (1918), No. 8, pp. 4*).—A brief discussion of the value and utilization of poultry manure and the home growing of poultry feeds.

A quick method of obtaining accurate individual egg records without the trap nest, B. Alder and A. D. Egbert (*Utah Sta. Bul. 162 (1918), pp. 3–12, figs. 8*).—In the method described the hens are confined in the house and not caught and examined shortly after daylight each morning, a record being made of those the examination indicates are to lay that day. The test is based on the fact that if a hen is to lay at any time during a given day, the egg can be easily felt early that morning by a slight pressure with the finger on the skin of the abdomen just below and nearly to the end of the pelvis bone. Directions are given for catching and examining the hen.

It is stated that with trained hens, two men at the station have been able to examine and record 500 hens in 16 colony houses in 37 minutes. By this method in 1915 out of a total of 42,886 eggs only ½ of 1 per cent were miscorded. In comparing the method with the trap nest, one pen in April, 1916, gave an indicated production of 308 eggs by this test, whereas 307 eggs were gathered, 19 of which were laid outside the trap nest. In May, 1916, the same pen tested 259 eggs and 251 were gathered, 15 of which were laid outside the trap nest.

Telling the age of eggs, S. L. Bastin (*Jour. Bath and West and Southern Counties Soc., 5. ser., 11 (1916–17), p. 132, pls. 2*).—A method is described and illustrated for determining the age of eggs by days up to four weeks. The egg

placed in a brine of water and salt, 2:1. Its position in the brine and the graduation shown on a degree scale indicates the age of the egg.

How to candle eggs, MARY E. PENNINGTON, M. K. JENKINS, and H. M. P. [illegible] (*U. S. Dept. Agr. Bul. 565 (1918), pp. 20, pls. 12, figs. 4*).—This bulletin describes two simple egg-candling devices, describes the structure of the egg, and tells how to hold an egg and what to look for in candling. The different types of eggs found in commerce are classified according to edibility and possibility of detection by candling, and a brief description of the appearance of each type of egg before the candle and out of the shell is given. These descriptions are tabulated, and plates, for the most part colored, illustrate the principal distinguishing characteristics.

The poultryman's guide, 1915, compiled by T. E. QUISENBERRY (*Ann. Rpt. Poultry Bd. [Missouri]. 1915, pp. 45–250, figs. 36*).—This contains the annual report of the State Poultry Board and a number of practical articles on the poultry industry written by members in various sections of the State of Missouri.

The poultryman's guide, 1916, compiled by C. T. PATTERSON (*Ann. Rpt. Poultry Bd. [Missouri], 1916, pp. 97, figs. 31*).—A guide similar to the above.

A good living from poultry for disabled soldiers and others, F. G. PAYNTER (*London: George Newnes, Ltd. [1917], pp. 39*).—This booklet deals with the subject of poultry raising under the following headings: Poultry for land settlement, egg production, stock birds, chicken rearing, and fattening.

The rearing of Angora rabbits for their wool, L. E. MOORE (*Jour. Bd. Agr. [London], 23 (1916), No. 7, pp. 664–668*).—A description of the industry as carried on in France.

DAIRY FARMING—DAIRYING.

A study of cattle "temperament" and its measurement, A. F. POTT (*Ohio Agr. Sci., 18 (1918), No. 4, pp. 129–144, figs. 8*).—The author attempts to establish a method whereby the nervous activity of cattle, or so-called "dairy temperament," may be measured. The results indicate that by means of pneumographic tracings the various nervous activities of cattle can be measured and recorded on a quantitative basis. The study was confined to the measurement of the variability of the depth of breathing shown by four Holstein cows under the same normal stable conditions. All the cows reacted similarly, differing only in degree of intensity of nervous reaction.

Conclusions as to which animal was the most nervous were drawn from the curve of intensity of the nervous reaction. The bearings of the results upon the interpretation of diary temperament are discussed. The present study takes no cognizance of physical characteristics or outward indications, it deals only with the actual reactiveness of the animal. Physical characteristics applied to 'dairy temperament' . . . have not been standardized, since they mean different things to different men, and what one man may call a prominent fe. another may not consider as such. It would be better then to speak of desirable physical characteristics, as dairy form, etc., alone, and not involve them with 'dairy temperament.' Instead of using this latter term, it might be better to speak of the degree of nervous activity or reactiveness which an animal possesses."

Gestation and sterility in cows, H. STALFORS (*Monatsh. Prakt. Tierheilk., 27 (1916), No. 7–8, pp. 338–358; abs. in Internat. Inst. Agr. [Rome], Internat. Rev. Sci. and Pract. Agr., 7 (1916), No. 12, pp. 1799, 1800*).—In gestation studies from 1907 to 1915 a large number of in-calf cows were examined for the pur-

pose of determining in which horn of the uterus the fetus was carried. The examinations were made per rectum some time between the sixth and fifteenth week of gestation, that period being the most favorable for the operation. fluctuation, asymmetery, and an increase in size of the uterus were taken as symptoms of pregnancy.

Out of a total of 923 cows examined, 577 cows carried the fetus in the right horn of the womb, and 346 in the left horn, proportions which are approximately those found by other workers. With 105 of the cows, the animals were kept under observation for two successive periods of gestation, and in 62 of the cases the fetus was twice carried in the same horn, indicating that the one ovary was rather more productive than the other.

The influence of handling on the production of ovaries was also studied. Six herds containing from 12 to 100 cows each were kept under special observation for five years, being visited every four to eight weeks, and any barren animals were subjected to an operation on the ovaries. This consisted in an exploration per rectum and of a squeezing or crushing of corpora lutea or cysts which might have persisted in the ovaries. The uterine catarrh resulting from the operation was treated at the same time by vaginal injections. Out of 261 cows so treated more than half became normally productive again. In 146 out of 211 cases of pregnancy after treatment it was possible to trace the fertilized ovum to the ovary which had been treated. A number of these pregnant cows were maintained under observation, and out of a total of 133, 81 proved to have become absolutely normal again, including a case of uterine catarrh independent of the ovaries. Of these normal pregnant cows, in 63 out of 77 cases the fertilized ovum was traced to the treated ovary.

The influence of the stage of gestation on the composition and properties of milk, L. S. PALMER and C. H. ECKLES (*Jour. Dairy Sci., 1 (1917), No. 3, pp. 185–198*).—The authors report data obtained in studies already noted (E. S. R. 37, p. 172) bearing on this question, and in addition studies on the influence which gestation exerts upon the composition of human milk.

In the study of the influence of gestation on cow's milk complete analyses were made of the milk and milk fat throughout the entire lactation period of 10 cows which became pregnant at various stages of their lactation period and of one cow which was farrow, and the complete analyses of the milk of 3 of the 10 cows throughout a subsequent lactation when they were kept farrow. The results of these analyses, which are tabulated, indicate that a close relation exists between a change in the percentage composition of the milk and the stage of the lactation period. No change in the composition of the milk due to the stage of gestation was noted.

In studying the composition of the milk fat it was found that the relation between changes in the milk fat and the stage of lactation is less constant. The same result holds true with respect to the relation of the composition of the milk fat to the stage of gestation. In comparing the composition on corresponding days of two lactation periods of each of three cows, during one period of which the cows were pregnant and the other farrow, it was found that the same shrinkage in milk flow and the same changes in the composition of the milk occurred at the end of the farrow lactation as took place at the end of the pregnant period, but at a somewhat later stage. It is concluded that gestation does not exert any direct effect upon the composition and properties of cow's milk, but that gestation may affect the composition indirectly by hastening the close of lactation, which is the important factor involved in the changes in the composition of milk as lactation advances.

Investigations of others relative to the effect of gestation on the composition of human milk are reviewed, and data are presented on this question, as

shown by analyses of 12-hour composite samples of milk of two negro women, the samples being taken in each case from the same breast at weekly intervals during portions of periods of lactation and gestation which overlapped. The results indicate that under normal conditions pregnancy exerts no influence on the composition of human milk, but that it may greatly hasten the close of lactation, with the changes in the composition of milk which accompany it, if lactation is sufficiently advanced when the period of gestation begins. Disturbances in the health of the child being nursed by a pregnant mother were not observed in the two cases reported.

The effect of green alfalfa on milk and its products. L. F. ROSENGREN (*Medd. Centralanst. Försöksv. Jordbruksområdet, No. 146 (1917), pp. 9, figs. 2; K. Lantbr. Akad. Handl. och Tidskr., 56 (1917), No. 4, pp. 273–279, figs. 2*).—In the experiments here reported the cows were fed green alfalfa and cowpeas as supplements to a ration of cottonseed cake, wheat bran, molasses, and wheat straw.

It was found that when green alfalfa was fed to the extent of 30 kg. per head daily an undesirable taste and smell was introduced into the milk. This taint increased with the increase of alfalfa, and was more pronounced in the evening than in the morning milk. Milk from the cows fed cowpeas had no foreign taste. The undesirable taint did not occur in the butter nor in cheese manufactured from the milk.

Investigations on the protease of milk bacteria, SWIATOPELK-ZAWADSKI (*Ztschr. Untersuch. Nahr. u. Genussmtl., 32 (1916), No. 4, pp. 161–170; abs. in Internat. Inst. Agr. [Rome], Internat. Rev. Sci. and Pract. Agr., 7 (1916), No. 11, pp. 1689, 1690*).—The following conclusions are drawn from experiments on the production of protease by milk bacteria:

Pure fresh milk contains no peptone. True lactic-acid bacteria do not dissolve casein within a period of seven days; i. e., they do not produce protease. The presence of peptone in a self-coagulated milk can only be attributed to the presence of peptonizing bacteria. The decomposition of casein and other albuminoid substances only occurs through the agency of bacteria. The rate at which the albuminoids are converted to peptones increases with the temperature up to 44° C.

Proteolytic ferments may be produced by aerobic and anaerobic bacteria, both spore-forming and nonspore-forming. In the present experiments the most active aerobic bacteria were *Bacillus pyocyaneus* (after 6 hours), *B. prodigiosus* (after 18 hours), and *B. coli communis* (after 24 hours); and among the spore-formers *B. subtilis* (after 6 hours) and *B. mesentericus vulgatus* (after 18 hours). The most active anaerobic bacterium was the spore-forming *B. paraplectum fetidum* (after 24 hours). The amount of peptone produced and the rate at which it is formed vary not only with the different species but often with different strains of the same species.

The hydrolysis of casein can take place independently of the coagulation of milk, which does not even assist the process. In the present experiment neither the amount of peptone produced nor its rate of production by aerobic bacteria was affected by the presence of other bacteria in the medium. At about 12° the activity of protease is always somewhat retarded. Sterilized milk inoculated with pure cultures of various organisms and incubated at 12° already contained peptone after 8 hours with *B. pyocyaneus* and *B. subtilis*, and after anything up to 14 days with *B. coli communis*, *B. prodigiosus*, *B. paraplectum fetidum*, and *B. mesentericus vulgatus*; or, in other words, the presence of *B. acidi lactici* in the unsterilized milk had no appreciable effect on the results.

Milk.—The indispensable food for children, DOROTHY R. MENDENHALL (*U. S. Dept. Labor, Children's Bur. Pub. 35 (1918), pp. 32*).—This publication includes a discussion of the milk situation, but deals mainly with the question of the value of milk as food for the child. Cow's milk is advocated for the feeding of infants who can not be breast fed. The value of milk powders and condensed and evaporated milk is also discussed.

A list of references is appended.

The daily per capita consumption of milk, H. F. JUDKINS (*Jour. Dairy Sci., 1 (1917), No. 3, pp. 246–249*).—A survey was made of the consumption of milk during three months in winter by 27 families in Storrs, Conn. Ten families with one or more children under 3 years consumed an average of 1.42 pints per head daily, in 6 families with children from 3 to 12 years the per capita consumption was 0.75 pint, and in 11 families with no children, 0.895 pint. The average for the 27 families was 1.07 pints per head daily. During the same time there was an average of 1.3 pints of milk consumed per head daily on the farms supplying milk to Storrs.

Marketing milk and cream in Florida, C. L. WILLOUGHBY (*Bien. Rpt. Dept. Agr. Fla., 14 (1915–16), pt. 2, pp. 181–135*).—The author shows the relative profits secured from selling milk, cream, butter, and ice cream at various prices and offers suggestions as to handling and shipping these products under Florida conditions.

[Delivery of milk in Chicago], W. O. NANCE ET AL. (*Chicago: Com. Health City Council, 1917, pp. 15*).—Suggestions are given for a cooperative system for the distribution and delivery of milk in Chicago.

Two model dairies in Habana (*Rec. Agr., Com. y Trab. [Cuba], 1 (1917), No. 1, pp. 20–26, figs. 11*).—Descriptions are given of two dairies in the vicinity of Habana in which milk is produced under sanitary conditions, and a plea is made for the improvement of the dairy industry of the island. An article by R. Gómez on Holstein cattle in Cuba is included, in which the value of this breed of cattle for improving native Cuban cattle by crossing is pointed out.

A survey of the Madras dairy trade. A. CARRUTH (*Dept. Agr. Madras Bul. 73 (1917), pp. 46, figs. 10*).—A general outline is given of conditions surrounding the milk supply of the city of Madras, special attention being paid to the sanitary and economic phases, and suggestions for improvement.

Method of preserving butter, T. PAUL (*Chem. Ztg., 41 (1917), pp. 74, 75; abs. in Jour. Soc. Chem. Indus., 36 (1917), No. 10, p. 561*).—In the method here described butter is melted at from 40 to 45° C., and the fat separated. While still warm 30 gm. of salt which has been strongly heated and then cooled to about 45° is added to each pound of fat. The vessel is allowed to stand for two or three hours in a warm place so that the fat remains fluid, and the mixture is meanwhile frequently stirred. It is then filtered through cotton wool in a hot-water funnel, and the filtered fat is placed in bottles, filled almost to the stopper, and kept in a cool, dark place. To reproduce the butter the fat is melted at about 40°, and 85 parts by weight is vigorously shaken with 15 parts of fresh milk for two or three minutes and the emulsion is rapidly cooled by ice water. Milk fat thus preserved is said to keep for at least a year.

Experiments on the manufacture of cheese from pasteurized milk, E. HAGLUND (*Meddel. Centralanst. Försöksv. Jordbruksområdet, No. 140 (1917), pp. 22; K. Landtbr. Akad. Handl. och Tidskr., 56 (1917), No. 1, pp. 43–62*).—Results are given of experiments on the effect of pasteurization of milk by the holding method upon the curdling of the milk in cheese making.

It was found that milk pasteurized by the holding method curdled more slowly than nonpasteurized milk. This difference in time of curdling was

...s marked when the pasteurized milk was cooled only to the temperature at ...h the rennet was introduced. Cheese from pasteurized milk lost moisture ... a longer period than that from nonpasteurized milk. This period of moisture exudation was shortened by cooling the milk to a low temperature immediately after pasteurization. Cheese from pasteurized milk contained more ...ein and fat-free dry matter than that from nonpasteurized milk. More fat ... lost in the curdling of pasteurized milk than of nonpasteurized milk, and ... loss of fat was greatest when the pasteurized milk was cooled only to the ...perature at which the rennet was added. The yield of cheese was smaller ... the pasteurized milk than from the nonpasteurized.

[Cheese exports from Canada], J. A. RUDDICK (*Agr. Gaz. Canada, 5 (1918), ... 3, pp. 242–244*).—Notes are given on the export cheese situation in Canada. ...ring 1917 there were accepted by the Cheese Commission for export to the ...eat Kingdom 1,860,237 boxes of cheese weighing 155,662,463 lbs., the total ...ports of the year to all countries being about 172,620,000 lbs.

VETERINARY MEDICINE.

A textbook of bacteriology, P. H. HISS, JR., and H. ZINSSER (*New York and ...don: D. Appleton & Co., 1918, 4. ed., rev., pp. XXI+852, figs. 198*).—The ...rth edition of this textbook (E. S. R., 32, p. 371) has been brought up to ...e by minor changes in the sections on immunity and bacteria in water and ...k, by revisions of the chapters on streptococcus and paratyphoid and ...ploid bacilli, and by new work on the Schick test and on the determination ... virulence of the diphtheria bacillus. The most important change is the ...dition of a section on Pathogenic Protozoa, by F. F. Russell, which gives ...cise information concerning the important pathogenic species, with special ...sideration to their common occurrence, the methods of their detection and ...mination, and correlation to the diseases which they incite."

Conference of officers of the French and British army veterinary service, ...d in France, January 12, 1918 (*Vet. Jour., 74 (1918), Nos. 514, pp. 118–...; 515, pp. 157–167*).—This is a report of the following addresses and accompanying discussions given at the conference: Glanders and Farcy, by J. ...ce (pp. 120–124); Notes on Epizootic Lymphangitis, by W. A. Pallin (pp. ...-130); Ulcerative Cellulitis or Ulcerative Lymphangitis, by A. C. Newsom ... 130–135); Periodic Ophthalmia, by A. C. Newson (pp. 157–161); and The ...trol and Treatment of Mange and Other Contagious Skin Diseases, by J. Wadley (pp. 161–166).

Some results of a survey of the agricultural zoology of the Aberystwith ...ea, C. L. WALTON (*Parasitology, 10 (1918), No. 2, pp. 206–231*).—This article ...ides a discussion of the occurrence of gid (*Multiceps multiceps*), one of ... most troublesome diseases of sheep in the Aberystwith Area in Wales; ...inococcus veterinorum (*Tænia echinococcus*), cysts of which were obtained ... the liver of a sheep that also contained specimens of *Distomum hepa...um*; "husk" or verminous bronchitis; *Syngamus trachealis; Ascaris suilla;* ...s; redwater; bloodsucking flies; warble flies; sheep maggot fly (*Lucilia ...ata*); etc.

Annual administration report of the civil veterinary department, Madras ...esidency, for 1916–17, D. A. D. AITCHISON (*Ann. Admin. Rpt. Civ. Vet. ...pt. Madras Pres., 1916–17, pp. 22, pl. 1*).—A report on the occurrence and ...atment of diseases of live stock, including a report of the Madras Veterinary ...llege.

Studies on immunity with special reference to complement fixation. I. BLUMBERG (*Jour. Lab. and Clin. Med., 3 (1918), No. 7, pp. 397–408; abs. in Jour. Amer. Med. Assoc., 70 (1918), No. 21, p. 1568*).—Complement fixations are classified in four groups in which (1) the antigens contain the specific organism of a certain disease either in a saline emulsion or as an autolysate, (2) the antigen is essentially the liquid culture of a specific organism, (3) the antigen is the watery or alcoholic extract of tissues, and (4) no antigen is present. The use of these groups in the diagnosis of different diseases is reviewed and discussed. Special technique for complement fixation without an antigen is described and its application in determining pregnancy explained as follows:

To 10 test tubes containing increasing amounts of urine 0.5 cc. of 20 per cent complement, 0.1 cc. of 10 per cent sheep-blood emulsion, and 2 units of hemolysin are added. The amount of urine contained in the first tube presenting complete hemolysis is the titer. To conduct the test three tubes are set up for each specimen to be tested. The first tube contains the complete hemolytic system and 0.15 cc. of the urine, the second contains the complete hemolytic system and 0.25 cc. of the urine, while the third, or control tube, contains 0.25 cc. of the urine and the hemolytic system without complement. To each tube 1 cc. of physiologic saline is added, after which the tubes are well shaken and put in the incubator at 37° C.

In case no hemolysis results within an hour the test is considered negative for pregnancy, but if hemolysis occurs (usually within the first 25 to 30 minutes) the test is positive. If there is hemolysis in the third tube it is due to some cause other than pregnancy.

Cases are given illustrating the possibilities of the use of this test.

The relation of circulating antibodies to serum disease, W. T. LONGCOPE and F. M. RACKEMANN (*Jour. Expt. Med., 27 (1918), No. 3, pp. 341–355, figs. 3*).—The object of the investigation was to determine the relations existing between the formation of antibodies to horse serum and the course of serum disease. The presence of antibodies was demonstrated in patients suffering from serum sickness by the precipitin and anaphylactin tests and by the presence of a specific skin reaction. Observations were made at short intervals before, during, and after serum disease. The methods employed are described and tables and charts are given of results obtained, from which the following conclusions are drawn:

"The injection of horse serum either in small or in large amounts in human beings is always followed sooner or later by the development of hypersensitiveness of the skin to subsequent injections of horse serum. For the development of this reaction serum disease is not essential. The blood serum of most patients who suffer from an attack of serum disease following injections of horse serum shows anaphylactin and precipitin for horse serum. Anaphylactin and precipitin can not be demonstrated in the blood serum of patients treated with horse serum who do not later present symptoms of serum sickness. The appearance of anaphylactin and precipitin precedes shortly recovery from the disease. With the appearance in the serum of antibodies to horse serum in great concentration, the antigen rapidly diminishes or disappears. It is probable that the extrusion of these antibodies into the circulation is the result and not the cause of serum sickness. Their presence serves to neutralize or destroy the antigen and thus determines the recovery from serum sickness."

A bibliography of 19 references to literature on the subject is appended.

Serum sickness, E. W. GOODALL (*Lancet [London], 1918, I, Nos. 9, pp. 323–327, figs. 3; 10, pp. 361–365*).—This is a general discussion of serum sickness and its relation to anaphylaxis and to secondary rashes in acute infectious dis-

. It is the opinion of the author that in the clinical manifestations of ... sickness is found the key to the secondary rashes occasionally accompanying acute infectious diseases. The disintegration of the bacteria causing ...sease sets free proteins which act slowly, giving rise to symptoms after ...al days.

The evolution of typhoid and paratyphoid fevers and of cholera.—Preventive vaccination and bacteriotherapy. J. DANYSZ (*Presse Méd. [Paris]*, ... (1918), *pp. 29–31; abs. in Jour. Amer. Med. Assoc., 70 (1918), No. 18, p.* ...).—The author discusses the infectious diseases acquired through the gastrointestinal canal and states that the infection is developed only in the case of individuals who are unable to digest completely the organisms of the disease and thus render them harmless. The course of the disease is determined by the amount of injected bacteria as well as by the intensity and rapidity of bacteriolysis and by the quantity of normal or preexisting antibodies—that is, by the degree of natural or acquired immunity.

The bacteria are classified according to their prevalence in nature, their susceptibility to gastrointestinal digestion and absorption, and the digestibility of the absorption products. Typhoid bacilli are less frequent and more difficult to digest and form more severe lesions than the paratyphoid in man, although the latter are more difficult for certain animals to digest (hog cholera and typhoid in certain rodents). Colon bacilli are widespread in nature and the products of their bacteriolysis are very easily digested and are consequently seldom pathogenic. The reverse is true of cholera vibrio.

For all diseases of intestinal origin the best method of preventive vaccination is considered to be the prolonged ingestion of dead bacteria in progressively increasing doses. The best curative method is specific bacteriotherapy by fractioned intravenous injections or by frequently repeated ingestion.

The influence of secretin on the number of erythrocytes in the circulating blood. A. W. DOWNS and N. B. EDDY (*Amer. Jour. Physiol., 43 (1917), No. 3, pp. 425–428*).—"It is possible to produce a considerable increase in the red corpuscle count per cubic millimeter of blood by the administration of secretin given in small doses and by subcutaneous injection. The most efficient dose is 1 cc. of secretin per kilogram of body weight. The increase in the count appears quickly and is very transient. By repeating the dose of secretin at short intervals the increase in the erythrocyte count can be kept up for several hours, but drops promptly after the administration of the last dose. The administration of secretin over a period of five days in daily doses of 1 cc. per kilogram of body weight has very slight, if any, lasting effect on the red corpuscle count in the normal animal."

Secretin.—II, Its influence on the number of white corpuscles in the circulating blood. A. W. DOWNS and N. B. EDDY (*Amer. Jour. Physiol., 45 (1918), No. 2, pp. 294–301*).—"It is possible to produce an increase in the number of white corpuscles per cubic millimeter of blood by the administration of secretin, given in small doses and by subcutaneous injection. The most efficient dose is 1 cc. of secretin solution per kilogram of body weight. The increase in the count appears quickly and is very transient, but is greater and more persistent than the increase in the erythrocyte count produced by the same means. By repeating the dose of secretin solution at short intervals the increase in the number of both the erythrocytes and the white corpuscles can be kept up for several hours, but is more marked and persists somewhat longer after the last dose in the case of the white corpuscles than in the case of the red corpuscles. It is suggested that the effects described are due to a direct stimulating action of secretin on both the bone marrow and the lymphatic tissues in general.

The results of previous experiments on the number of erythrocytes in circulating blood are confirmed."

Carrel's tube treatment for septic wounds as adapted to veterinary surgery, E. S. W. PEATT (*Vet. Jour.*, 74 (*1918*), *No. 514, pp. 136–149, figs. 11*).—This treatment is a modification of Carrel's tube treatment in use for septic wounds in the human subject. The apparatus required is described with diagrams, and directions are given for the preparation of the antiseptics used (Eusol, Dakin's solution), the preparation and method of dressing the wounds, and the application of the antiseptic. Descriptions are given of several cases treated by this method with excellent results.

The mechanism of the action of anesthetics, W. E. BURGE, A. J. NEILL, and R. ASHMAN (*Amer. Jour. Physiol., 45* (*1918*), *No. 4, pp. 388–395, fig. 1*).—"Narcotics of widely different constitution, such as chloroform, ether, chloral hydrate, nitrous oxid, and magnesium sulphate, decrease the catalase of the blood, parallel with the increase in the depth of narcosis. A very powerful anesthetic, such as chloroform, decreases the catalase more quickly and excessively than does a less powerful anesthetic, such as ether. Slowly-acting anesthetics, such as chloral hydrate and magnesium sulphate, decrease accordingly the catalase of the blood more slowly than a quickly-acting anesthetic, such as nitrous oxid."

The theory is advanced that "narcosis is due to the direct destruction of catalase by the narcotic, with resulting decrease in oxidation, while recovery from anesthesia is brought about by an increase in catalase due to the increased output from the liver, with resulting increase in oxidation."

Chemical investigations on periodol, A. SCALA (*Ann. Ig. [Rome]*, 28 (*1918*), *No. 2, pp. 57–67*).—The author states that the disinfectant, periodol, previously noted by Sampietro (E. S. R., 39, p. 80), is a mixture of potassium hypochlorite, chlorin, and iodin in combination with potassium chlorid and iodid. Dissolved in water containing carbonates, it decomposes with evolution of free chlorin and iodin, the decomposition being total or partial, depending upon the amount of carbonate in the solution and the concentration of the periodol. The antiseptic and sterilizing action of the periodol is due principally to the ease with which the nascent chlorin and iodin attack the protein material of the microorganisms, altering their structure or destroying their ordinary functions.

The ordinary water solution of periodol can be rendered stable by the addition of 10 per cent of common salt.

Apparatus for use in examining feces for evidences of parasitism, M. C. HALL (*Jour. Lab. and Clin. Med., 2* (*1917*), *No. 5, pp. 347–353, figs. 3*).—The author here describes certain changes in the apparatus used in examining feces as described in the bulletin previously noted (E. S. R., 25, p. 150) and a subsequent edition with addenda, which he has found advantageous.

A highly differentiating polychromatic toluidin-blue stain, M. BARSKY (*Jour. Lab. and Clin. Med., 3* (*1918*), *No. 7, pp. 432–434*).—In the preparation of the stain the polychromatic qualities of toluidin-blue are increased by boiling with an alkali such as potassium carbonate. The method of preparation of the stain and colors obtained in its use are described. The stain is said to be particularly valuable for the examination of feces for ova and parasites and in identifying diphtheria bacilli.

On the development of Ascaris lumbricoides and A. mystax in the mouse II, F. H. STEWART (*Parasitology, 10* (*1918*), *No. 2, pp. 189–196, pl. 1*).—This is a report of investigations, carried on in continuation of those previously noted (E. S. R., 37, p. 374), in which the larvæ of *A. lumbricoides* were traced in the rat and mouse from the ninth to the fifteenth day after infection, but not later

"Larvæ are found in the mouths of infected mice on the eighth day, on which they are also abundant in the lungs and trachea. They persist in the lungs up to the fifteenth day. On the ninth day they begin to travel down the alimentary canal and may be found in small numbers in the stomach, small intestine, and cecum. On the tenth day this stage is fully established, the larvæ travel with some rapidity through the stomach and small intestine and accumulate in the cecum and upper colon; where as many as 60 to 70 may occur. On this day they also commence to pass out in the feces. The passage from the lungs to the cecum continues up to the fifteenth day, and larvæ occur in the feces on the sixteenth day. Between the ninth and fifteenth days the larvæ increase in length. They measure from 1.3 to 2 mm. on the tenth day and 1.75 to 2.37 mm. on the fifteenth."

The eggs of *A. mystax* (*A. marginata*) were administered to mice in their food, and active larvæ were found in the liver between the first and third days after infection.

See also a paper by Ransom and Foster previously noted (E. S. R., 38, p. 385).

A note regarding myiasis, especially that due to syrphid larvæ, M. C. Hall (*Arch. Int. Med., 21 (1918), No. 3, pp. 309–312*).—A brief review of the subject with references to the literature.

Erysipelas in pigeons and ducks, and culture differences in erysipelas bacilli, J. Poels (*Folia Microbiol. [Delft], 5 (1917), No. 1, pp. 1–18*).—The author reviews the literature on the subject of erysipelas in swine, mice, pigeons, etc., and discusses particularly the symptoms and culture characteristics of the disease in pigeons and ducks.

The conclusion is drawn that the disease is caused by different strains of the same bacillus possessing different culture characteristics, as follows: (1) The erysipelas bacillus proper, which grows in gelatin along the inoculation stab in small kernel-shaped colonies, seldom forming filaments; (2) a bacillus which shows in a gelatin stab a strong tendency to rapid formation of filaments; and (3) a form which develops very slowly. The first strain has a predisposing tendency for swine and birds, the second is found in the erysipelas of mice and in polyarthritis of sheep, and the third is found in swine that have died of erysipelas in an epizootic form. These strains may also be recognized by the differences in rapidity of growth in gelatin culture. All the strains can produce erysipelas in swine, but the first and second do so only under a strong predisposing influence.

The erysipelas serum has generally the strongest curative influence toward the third strain of bacilli.

Some remarks and suggestions on the vaccine and serum methods of treatment of ulcerative lymphangitis, E. A. Watson (*Vet. Jour., 74 (1918), No. 515, pp. 170–175*).—The author offers suggestions for the observation of cases which have received the vaccine and serum treatment for ulcerative lymphangitis in order to determine whether such treatment is permanent or temporary. A comparison is reported of the efficacy of four modes of treatment of the disease as observed in groups of five animals each. The serums and vaccines used were (1) serum obtained from horses immunized to large doses of virulent cultures of Preisz-Nocard bacilli, (2) anti-Preisz-Nocard vaccine prepared by the alcohol-ether method, (3) polyvalent mixed vaccine containing mixed strains of pyogenic streptococci, staphylococci, and Preisz-Nocard bacilli, originating from ulcerative lymphangitis lesions, and (4) pus bovine serum prepared from pus collected from unopened abscesses and from purulent kidneys in cases of the disease.

The best results were obtained by the use of serum and anti-Preisz-N... vaccine and the anti-Preisz-Nocard vaccine alone, all cases remaining appar... cured. Rapid improvement followed the use of serum and pus vaccine o... the latter alone, but it was not always maintained. The pus vaccine is ... rich enough in Preisz-Nocard bacilli to produce the required amount of ... bodies to overcome severe infection.

The point of election and modes of invasion in pulmonary tubercul... J. O. Cobb (*Jour. Amer. Med. Assoc., 70 (1918), No. 21, pp. 1511–1516, figs. ...*).—The author summarizes the experimental evidence regarding the modes of ... sion of the tubercle bacillus in pulmonary tuberculosis, and concludes that ... is a fair assumption that, commonly, infection in man and animals is by ... ingestion method. This does not lessen the potential danger of infection ... as much of this dust would be swallowed, even though planted on respira... mucous membranes by inhalation.

Possible causes for the initial point of lodgment of the organism in ... apexes of the lungs in man and in the caudal lobe of the cow's lung are ... cussed. Since no portion of the lung possesses a specific biochemical con... ent that would sensitize it to the bacillus and since the bacillus does not pos... selective properties in any special portion of the lung, it is concluded that ... lodgment of bacilli in the superior part of the lungs in both the cow and ... is due to mechanical causes influencing them along unusual lines.

The intradermal or intracutaneous tuberculin testing of guinea pigs. J. TRAUM (*Cornell Vet., 8 (1918), No. 1, pp. 2–6*).—In the author's work deli... reactions to the intradermal test, which is considered to be the most desirable test for suspected guinea pigs, appeared in some instances by the twelfth day after the inoculation of tuberculous material but experience has shown that uniformly good results are not to be looked for before the sixteenth day. That certain nontuberculous guinea pigs retested in 11 and 12 days responded is considered by the author to be due to the fact that the initial injection of tuberculin had a sensitizing effect and that the second injection was given at a time when this effect was at its height.

The failure of tuberculous guinea pigs to react to this test is exceedingly rare and consists principally of (1) animals suffering from acute intercurrent diseases; (2) animals in the very last stages of the disease when the resistance is entirely broken down; (3) pregnant animals at times; (4) animals in which hypersensitiveness is so great that even the usual dose will kill them before sufficient time has elapsed for the appearance of the local reaction, and (5) animals in which tuberculous foci have not developed.

Eradication of tuberculosis in animals. H. R. SMITH (*Amer. Jour. Vet. Med., 13 (1918), No. 3, pp. 140–143*).—This is part of a discussion by the author at the annual meeting of the United States Live Stock Sanitary Association held in Chicago, in December, 1917.

Effect of tuberculin test on milk yield. J. J. HOOPER (*Breeder's Gaz., ... (1918), No. 20, p. 1032*).—In order to determine whether the tuberculin test reduces the milk flow, tabulations were made at the Kentucky Experiment Station of milk produced by 10 cows before and after the test.

The cows gave an average of 21.45 lbs. of milk daily for three days preceding and succeeding the tuberculin test and on the two days of the test an average of 20.98 lbs. As this is a practically inappreciable decrease, the author states that there need be no hesitancy in using the tuberculin test on the ground that there will be a reduction in the milk flow. It is recommended that every herd be tested once or even twice a year.

Further studies on Bacterium abortus and related bacteria. I, II. ALICE C. [illegible]. (*Journ. Infect. Diseases, 22 (1918), No. 6, pp. 576-593, figs. 3*).—Two papers are presented:

I. *The pathogenicity of B. lipolyticus for guinea pigs* (pp. 576-579).—A series of inoculation and feeding experiments with guinea pigs were conducted to determine whether *B. abortus* var. *lipolyticus*, previously noted (E. S. R., 35, p. 771), might cause disease-producing properties. The author concludes that although these experiments do not demonstrate the harmlessness of *B. lipolyticus* as clearly as could be desired, due to the complications with the two contagious infections, no evidence was found to show that it is pathogenic for guinea pigs."

II. *A comparison of B. abortus with B. bronchisepticus and with the organism which causes Malta fever* (pp. 580-593).—The three organisms *B. abortus*, *B. bronchisepticus*, and *B. melitensis* are described in detail and compared as to morphology, staining, cultural characteristics, and biochemical reactions. Their comparative pathogenic action was determined by inoculation tests with guinea pigs, and by subsequent agglutination and absorption tests.

The results show that *B. abortus* and *B. bronchisepticus* are closely related. *B. bronchisepticus* can be easily distinguished from *B. abortus* by its motility, more rapid and abundant growth in all artificial media, its more intense alkaline reactions, and its agglutination in *B. abortus* immune serum only in low dilutions. *B. melitensis* is even more closely related to *B. abortus*, the only distinguishing property being the agglutination of *B. melitensis* suspensions in higher dilutions of *B. melitensis* serum than will agglutinate suspensions of *B. abortus*.

The close relationship between *B. abortus* and *B. melitensis*, which is pathogenic to human beings, is considered by the author to add a new interest to the question of the possible pathogenicity of *B. abortus* to human subjects. As a possible explanation of the fact that in spite of the frequency of virulent strains of *B. abortus* in cow's milk, a disease resembling Malta fever is not prevalent in this country, it is suggested that the actual number of virulent bacteria in cow's milk is small in comparison with the number of *B. melitensis* in the milk of goats in Malta. The question is raised, however, whether cases of glandular disease or cases of abortion, or possibly diseases of the respiratory tract, may not occur among human subjects in this country as a result of drinking raw cow's milk.

Contagious abortion disease in cattle. W. GILTNER and G. M. POTTER (*Amer. Jour. Vet. Med., 13 (1918), No. 3, pp. 105-110, 155, 156*).—This is a report presented by a committee of the United States Live Stock Sanitary Association and presented at the twenty-first annual meeting of the association, held in Chicago in December, 1917.

In order to ascertain where and to what extent the disease exists, what efforts are being made to control it, views as to the methods of dissemination, and the most practical measures for combating it, a questionnaire was addressed to investigators, State veterinarians, directors of experiment stations, and practitioners. Replies were received from approximately 30 States and 40 individuals, and are summarized under the headings of history and distribution, cause, dissemination, persistence, organs involved, diagnosis, attendant conditions, immunity, etc.

The story of the cattle fever tick.—What every southern child should know about cattle ticks (*U. S. Dept. Agr. [Pub.], 1917, pp. 31, figs. 28*).—This is a popular account, intended particularly for children, in which the life

history and habits, economic importance, and means for the eradication of the cattle tick are described.

Contribution to the study of the diseases of calves.—Broncho-pneumonia caused by colon bacilli, L. COMINOTTI (*Clin. Vet. [Milan], Rass. Pol. Sanit. e Ig., 41 (1918), No. 7, pp. 167–173*).—Experimental evidence is given proving that colon bacilli can produce in calves broncho-pneumonia of a subacute type. The first symptom of the disease is a gradually increasing cough, followed by loss of appetite and rise in temperature. The pulmonary lesions are similar to those of ordinary broncho-pneumonia, the alveolar spaces being filled with leucocytic material. Occasionally there is hypertrophy of the lymphatic ganglia. Nodular formations are sometimes present from which *Bacillus coli* can be isolated. In some cases the disease becomes localized in the joints, probably due to a secondary reaction caused by streptococci.

Dehorning and castrating cattle, F. W. FARLEY (*U. S. Dept. Agr., Farmers' Bul. 949 (1918), pp. 15, figs. 12*).—A popular account.

Liver rot of sheep and bionomics of Limnæa truncatula in the Aberystwith Area, C. L. WALTON (*Parasitology, 10 (1918), No. 2, pp. 232–266, figs. 5*).—In the survey conducted as noted on page 283 in Wales particular attention was given to the study of liver rot of sheep and the bionomics of *L. truncatula*, its host snail, the results of which are here reported upon.

Investigations concerning the sources and channels of infection in hog cholera, M. DORSET, C. N. MCBRYDE, W. B. NILES, and J. H. RIETZ (*Jour. Agr. Research [U. S.], 13 (1918), No. 2, pp. 101–131, fig. 1*).—Investigations conducted by the Bureau of Animal Industry of the U. S. Department of Agriculture with the view of determining the manner in which hog cholera may be transmitted are summarized by the authors as follows:

"The eye and nose secretions, the blood, the urine, and the feces of cholera-infected pigs were tested on the first, second, third, fifth, seventh, and ninth days after infection. When injected, the eye and nose secretions and fecal suspensions were found to be infectious on the third day; the urine was quite regularly infectious by the fourth or fifth day, and the blood was infectious as early as the first day. When fed and when scattered in pens, the freshly collected secretions and excreta were noninfectious as a rule. Secretions and excreta which were held at room temperature (60 to 85° F.) for 24 hours remained infectious when injected. When the secretions and excreta were held at the same temperature for 48 hours the urine and feces remained infectious, but the eye and nose secretions were no longer so. It might appear, therefore, that outside the animal body the virus in the eye and nose secretions succumbs more quickly than the virus in the urine and feces, but such a conclusion is not justified by these experiments, as the virus from the eye and nose was allowed to dry on swabs. This point requires further study with the virus from the different sources held under identical conditions. Finally, it should be noted that the eye and nose secretions may be infectious before there is any visible discharge from the eyes or nose.

Susceptible pigs were exposed by association with cholera-infected pigs for 48-hour periods on the first, third, fifth, seventh, ninth, and eleventh days after infection. With the exception of those exposed on the first and second days—that is, during the first 48-hour interval—all of the exposed pigs contracted hog cholera. Other pigs which were exposed to cholera-infected pigs at 17 and 21 days contracted hog cholera. Cholera-infected pigs therefore may transmit the disease by contact at practically all stages of the disease, even in the period of incubation, before the appearance of visible symptoms and before the animal can be recognized as sick.

Susceptible pigs were exposed by being placed in pens with pigs which had recovered from typical attacks of hog cholera but had recovered. Other susceptible pigs were inoculated with blood drawn from the recovered pigs. Four recovered pigs were tested in this way to determine whether they harbored the virus of cholera within their bodies and might act as carriers of the disease. None of the pigs exposed to the recovered pigs, either by association or by blood injection, developed hog cholera. The exposed pigs were later proved to be susceptible by virus injection.

Susceptible pigs were exposed for long periods of time to pigeons, which passed daily from a heavily infected pen only 10 ft. away and which contained sick and dying pigs, to a pen containing susceptible pigs. The exposure in these experiments was severe, as the pigeons were afforded every opportunity to carry the infection over a very short distance. Notwithstanding this, none of the exposed pigs developed cholera. All of the exposed pigs were later proved to be susceptible either by virus injection, by association directly with sick pigs, or by exposure in an infected pen. These experiments extended through the fall and well into the winter. While the assumption would hardly be warranted that pigeons never convey hog cholera, it does not seem likely that they are often concerned in the spread of this disease.

Rats were fed on the meat of cholera hogs for periods of 5 and 21 days. The rats were then killed, their entire bodies chopped up, mixed with bran mash, and the mixture was fed to susceptible pigs. None of the pigs thus fed contracted cholera. The pigs were proved to be susceptible by subsequent virus injection."

Epizootic lymphangitis and cutaneous blastomycosis in horses, G. DEGREEF (*Bul. Agr. Congo Belge, 8 (1917), No. 3-4, pp. 307-311*).—This is a general article describing the causal agent, *Cryptococcus farciminosus*, and various clinical forms of the disease as observed by the author.

[Treatment of parasitic mange] (*Vet. Rev., 2 (1918), No. 1, pp. 52-55*).—A review of recent literature on scabies in the horse and measures for its control.

Treatment of mange in the horse by nicotin, QUERRUAU (*Rev. Gén. Méd. Vét., 26 (1917), No. 309, pp. 405-414; abs. in Vet. Rev., 2 (1918), No. 1, pp. 55, 56*).—For the treatment of mange in horses under army conditions the author recommends the application of a dressing consisting of extract of nicotin 30 gm., water 1,000 gm., and carbonate of sodium 3 gm. The procedure of treatment is outlined as follows: First day, dry rubbing of the anterior half of the body, followed by the application of from 2 to 3 pints of the dressing; third day, rubbing and the application of the dressing to the posterior half of the body; and fifth and seventh days, repetition of the treatment outlined for the first and third days, respectively.

Infectious asthenia of fowls, A. G. G. RICHARDSON and R. E. REBRASSIER (*Vet. Alumni Quart. [Ohio State Univ.], 5 (1918), No. 3, pp. 76-79*).—The authors' experiments in Ohio substantiate the conclusions of Dawson (E. S. R., 38, p. 604) that asthenia in fowls is caused by *Bacterium asthenia*. It appears that in order to produce the disease artificially the bacillus must be introduced directly into the duodenum.

RURAL ENGINEERING.

The wet lands of southern Louisiana and their drainage, C. W. OKEY (*U. S. Dept. Agr. Bul. 652 (1918), pp. 67, pls. 2, figs. 15*).—This is a revision of Bulletin 71 (E. S. R., 31, p. 185) embracing results of later observations and including a discussion of the problems involved in land drainage by means of

pumps in Louisiana, in continuation of a previous bulletin dealing with ... ing in the Upper Mississippi Valley (E. S. R., 34, p. 283).

"The drainage of these lands has been uniformly successful, and fr... drainage engineer's standpoint the work is now well past the experi... stage. Where successful drainage has not been attained it has been d... insufficient and poorly constructed improvements rather than to inher... insurmountable difficulties. On some of the districts the improvement... been installed without competent engineering advice and services, and w... successful drainage has been secured in some such cases, it was not s... with the greatest economy. The earlier faults were due principally to ... to drain the land too cheaply. This has been demonstrated to be false ec... and the present practice is almost uniformly of such a grade as will ultim... result in the complete drainage of the lands of this section."

The case against hard water, R. HULBERT (*North Dakota Sta. Spec. ... 5 (1918), No. 2, pp. 22–27*).—A part of this article deals with hard water ... health. The question as to whether the presence of large amounts of harmless salts in drinking water may cause certain diseases such as constip... dyspepsia, impairment of digestion, diarrhea, goitre, and the formation ... urinary and biliary calculi is discussed and the opinions of certain authors ... cited. The conclusion is reached that probably moderately hard water is ... injurious and is not therefore necessarily inferior to soft water for drinking. The consensus of medical opinion is, however, emphatically in favor of ... water for drinking where this can be obtained free from organic impurities and unnatural ingredients.

The disadvantages of hard waters in laundry work, cooking, and for use in boilers are also discussed.

Public Roads (*U. S. Dept. Agr., Public Roads, 1 (1918), No. 1, pp. 14*).—The initial issue of this periodical discusses its proposed scope, and presents several articles and notes dealing with various phases of road construction and maintenance. A complete compilation of all State projects submitted up to February 28, 1918, under the Federal Aid Road Act and rules under the act are presented. Data as to motor-car registration, by A. ... Anderson, are included, and an article entitled Saving Fuel in Highway Work by G. E. Ladd.

The preservation of wood, A. J. WALLIS-TAYLER (*London: William Rider & Son, Ltd., [1918], pp. XIX+344, figs. 119*).—A descriptive treatise on the processes and mechanical appliances used for the preservation of wood. The successive chapters discuss the destruction of wood by decay and the ravages of insects, seasoning or drying wood, the preservative treatment of wood, preservative agents and processes, various proprietary and other preservative solutions, the absorption limit and life of preserved wood, fireproofing and fire-retardant treatment of wood, and cost of preservative treatment. Various formulas, tables, memoranda, etc., are appended.

Care and repair of farm implements.—No. 3, Plows and harrows, E. ... MCCORMICK and L. L. BEEBE (*U. S. Dept. Agr., Farmers' Bul. 946 (1918), pp. 9, fig. 1*).—Suggestions are given for the care and repair of various types of plows and harrows.

Care and repair of farm implements.—No. 4, Mowers, reapers, and binders, E. B. MCCORMICK and L. L. BEEBE (*U. S. Dept. Agr., Farmers' Bul. ... (1918), pp. 15, figs. 8*).—Suggestions are made for the care and repair of these implements.

A rotary seed harvester for crimson clover, A. J. PIETERS (*U. S. Dept. ... Bur. Plant Indus., F. C. I. 47 (1918), pp. 8, figs. 7*).—A description is given ...

developed from the device previously noted by Westgate (E. S. R., [illegible]). Public-service patents for this machine have been taken in the name of J. F. Barghausen.

Tests made with the machine in a field of somewhat immature crimson clover at Raleigh, N. C., are reported, together with a subsequent test by W. L. Yates, of the North Carolina College.

It was found that a rotary seed harvester of this type will do its best work when the ground is relatively level and the clover dry, and with at least 75 per cent of the seed ripe. It is claimed that under these conditions upward of 90 per cent of the seed should be harvested, and that under favorable conditions nearly 10 acres a day can be harvested.

RURAL ECONOMICS.

Farm profits and factors influencing farm profits on 284 general farms and 75 dairy farms in Monmouth County, N. J., F. Abr (*New Jersey Stas. Bul. 312 (1917), pp. 7–89, pls. 8, figs. 6*).—This bulletin contains two reports, one relating to 284 farms located in Upper Freehold and Millstone Townships, Monmouth County, N. J., and the other to 75 dairy farms also located in the same county. Among the conclusions brought out by the author were the following:

The average labor income for general farms operated by owners was $191, for those operated by part owners, $760, and for those by tenants, $653. Cash renting rather than share renting gave the tenants the larger labor income. Landlords received 6.1 per cent on their capital invested, not including rise in land values. The average farm investment was $13,602 for farm owners, $7,014 for tenants, and $13,437 for landlords. The owner farms averaged 68.8 crop acres and 110.4 farm acres, and tenant farms, 91 crop acres, 136.9 farm acres. Owners having over 151 crop acres received $2,145 labor income, and similar tenant farms, $1,695. The margin of receipts above expenses increased with each additional investment for fertilizer and labor, so far as they were used on farms having yields above the average. Men and horses care for as many (or more) crop acres on the high as on the low producing farms. The workers obtained 211.9 work units and tenants 235.4 work units per man. The major measures of success for these farms were size, production, and number of work units per man; the minor measures of success were largely productive power of stock, proper proportion of stock and crops, proper crop rotation, work units per horse, and distance from railway.

The labor income for the 75 dairy farms was $937 per farm. Farm owners had $14,582 invested per farm, cash-renting landlords $11,700, share-renting landlords $14,583, cash tenants $3,699, and share tenants $2,416. On the 75 dairy farms, representing an average investment of $14,949, $11,080 was invested in real estate, $2,356 in live stock, $747 in machinery, $435 in feed and supplies, and $331 in cash. The number of crop acres on the owner dairy farms averaged 66.6, and the farm area 106.3 acres, while the tenant farms averaged 78 crop acres and 165 farm acres. Large dairy farms were more efficient in their use of man, horse, and machine labor. "Expenses per crop acre increase with increased production but not nearly so rapidly as receipts. Cows on farms receiving the highest receipts per cow made the largest labor income."

A farm-management survey in Brooks County, Ga., E. S. Haskell (*U. S. Dept. Agr. Bul. 648 (1918), pp. 59, figs. 21*).—The 106 farms surveyed in this county, which was selected because within it has been developed a diversified and

profitable type of agriculture, with cotton retained as the chief single source of income, averaged in size 331 acres, of which 145 acres were devoted to principal crops. Three-fourths of the average farm capital consisted of real estate and the other fourth working capital. For every acre of land in crops these farms had $7.34 invested in live stock, $4.66 in feed and supplies, and $2.28 in implements and machinery. The average market price of the land was found to be $20.50 per acre, while the crop land alone was valued at $30.30 and would rent for $3.09.

The total number of animal units per farm was 28.6, of which cows comprised 12.2, swine 11.1, work stock 4.4, poultry 0.7, and others 0.2. Fifty and two-tenths per cent of the receipts were from cotton, 15.7 from swine, 4.4 from cattle and products, 5.6 from corn, 2.6 from miscellaneous crops, 6.1 from oats and rye, 5.8 from watermelons, 3 from feed and supplies, 1.1 from poultry and eggs, 1.5 from sugar cane and sirup, 1.7 from cowpea hay, 1.7 from miscellaneous receipts, and 0.6 from other live stock.

It was found that the cropper's average receipts were $388.70 and his expenses $130.26, making his net income $258.44. It is estimated that $125.00 was the amount that he would have received for the same labor had he been working for wages.

The bulletin discusses in detail the labor system, the size of business, the quality of farm business, organization, and the cost of production for principal crops.

A farm-management study in Anderson County, S. C., A. G. SMITH (*U. S. Dept. Agr. Bul. 651 (1918), pp. 32, figs. 6*).—This is a digest of a farm-management and cost-determination survey of 112 farms in Williamston, Belton, Broadway, and Honeapath Townships, in Anderson County, S. C. A correlation study made from the data secured showed that as far as the methods used on these farms were concerned yields constituted 62 per cent, acres per work animal 22 per cent, and the combination of enterprises 16 per cent of the total weight of these three factors in influencing the percentage return on the investment.

The more important facts brought out by this bulletin are that the cost of producing cotton was 10.89 cts. per pound gross lint, corn $1 per bushel, oats 43.3 cts. per bushel, oat hay $13.88 per ton, and cowpea hay $14.10 per ton. Cotton was produced at its market value when yields were 240 lbs. of net lint per acre and corn when yields were 17 bushels per acre.

The farms that planted from 20 to 23 acres of crops per work animal were the most profitable. Farms that had from 21 to 25, 41 to 45, and 61 to 65 acres of crops, good sizes, respectively, for one, two, and three mule farms, were more profitable than those that had intermediate sizes. The farms made an average of 3.65 per cent on the investment.

The cost of producing feed crops is such that it is profitable to grow them only in sufficient quantities to insure a supply for home consumption. The tendency of farmers and the most profitable procedure is to grow the necessary home supplies and then grow all the cotton that conditions permit.

As a general proposition where from 20 to 23 acres of crops are planted per work animal 40 per cent should be planted in field crops and 60 per cent in cotton.

Farm organization in the irrigated valleys of southern Arizona, R. W. CLOTHIER (*U. S. Dept. Agr. Bul. 654 (1918), pp. 58, figs. 12*).—This bulletin presents the results of a farm survey of 627 farms located in the Salt River, Gila, and Yuma valleys, Arizona. Among the conclusions drawn by the author were that over 25 per cent of the farms in the three valleys failed to pay cur-

...interest rates on investments, owing largely to a farm organization based ...arily on relatively unprofitable enterprises.

...arying was found to be the most staple as well as the most popular enter... in the valleys, contributing 67.7 per cent of the receipts on 178 farms. ...ing alfalfa for hay ranked next in popularity.

...Cotton farming is a new enterprise, based on an acclimatized variety of ...ptian cotton which promises to be a profitable rotation crop with alfalfa. ...n farming is relatively profitable only on the cheaper lands. Poultry ...g is a profitable enterprise, especially on the small farms, and is an im... side line on farms of all sizes.

...Fruit farming is relatively profitable on the small farms, though fruit lands ...so highly valued that they often fail to pay current interest rates on their ...ation. They furnish a relatively high standard of living and a relatively ... standard of wages to the farmer. Trucking and gardening are unpopular, ... are believed by most of the farmers in the districts to be unprofitable. ...ploups are highly speculative, sometimes returning high profits and some... failing to pay freight bills on shipments.

...Diversified farming when based on dairying or poultry is relatively more ...fitable than hay farming but not as profitable as dairying. It has made its ... development on farms of medium size where dairying and poultry are ...ongly emphasized among the diversified enterprises. Some adaptation of ... to size of farm is necessary, poultry raising, dairying, and fruit farming ...ng required on small farms, dairying being adapted to the farms of medium ... and the beef-cattle enterprise giving the best returns on the larger farms."

Lease contracts used in renting farms on shares, E. V. WILCOX (*U. S. Dept. ... Bul. 650 (1918), pp. 36*).—This report is based on a study of 258 lease con...cts and farm-survey records from 2,907 farms covering the principal types ... farming.

It was found that in the majority of cases the leases run for only one year, ...ally with the privilege of renewal on one or two months' notice. The bulle... discusses the methods of sharing crops and live-stock produce; methods of ...ring pasture; contracts for clearing land; ownership of equipment; methods ... sharing expenses; unexhausted value of fertilizers; repairs and improve...nts; privileges and perquisites; restrictions; supervision by the landlord; ... the general system of share leasing. The author states that an obvious ...mption underlying adjustments in the various types of contracts is that ... landlord of more fertile land is entitled to a larger share of the crop than ... landlord possessing poor land under otherwise similar conditions. A sam... stock share lease, together with suggestions toward a rational lease con...ct, are included.

The farm labor problem, C. OUSLEY (*U. S. Dept. Agr., Office Sec. Circ. 112 ...18), pp. 10*).—The author maintains that there is man power sufficient in ... United States to plant and harvest the desired farm crops if properly mobil...d by cooperation and community action. He points out the influence of the ...ft upon farm labor supply and the availability of town men of farm experi...e, boys who are members of the boys' working reserve, women, idlers, and ...ers. He calls attention to the cities' responsibility in aiding in the solving ... the local farm-labor problem, and also to the recent report of the advisory ...mittee of farmers and live-stock producers with reference to this problem.

Report of advisory committee of agricultural and live-stock producers (*... S. Dept. Agr. [Pub.], 1918, pp. 32, fig. 1*).—This report contains statements ... the Secretary of Agriculture and the Food Administrator to the advisory ...mittee of agricultural and live-stock producers at a consultation in Wash-

ington, D. C., March 28 to April 4, together with information concern... personnel of the advisory committee. The functions of the commit... explained and advice on remedial measures was requested from the co... concerning some of the agricultural problems of the country. Among th... included the question of price as it is effected by government buyi... handling of the sugar and other crops; the obtaining of nitrate; the ex... of the seed service; questions of farm labor and machinery; of live st... dairying.

Monthly crop report (*U. S. Dept. Agr., Mo. Crop Rpt., 4 (1918), No. ... 45-56, figs. 4*).—This report contains data regarding the condition M... winter wheat, rye, hay, and spring pasture, and the percentage of spri... ing and planting done on May 1, the estimated farm value of important pr... on April 15 and May 1, the average prices received by producers, and the ... of prices of agricultural products at important markets. It also contains s... reports on the condition of the peaches, production of maple sugar and ... crop conditions in Florida and California, crop acreage by States, Lou... sugar-cane acreage, stocks of hay May 1, acreage and yield of edible drie... in important producing States, index figures of crop prices, percentage of ... reporting various crops and live stock (1910 census), winter-sown oats ac... the relative supplies of crops on farms January 1, the honey bee and condit... colonies May 1, an estimate of the time when the crop of potatoes is dis... of, a statistical article with reference to the southern production of cow... soy beans, velvet beans, and peanuts, etc.

Farmers' market bulletin (*North Carolina Sta., Farmers' Market Bu... (1918), Nos. 21, pp. 7; 22, pp. 9; 23, pp. 7*).—These numbers contain the ... list of products which farmers have for sale, together with special repor... the demand for Irish and sweet potatoes, and the mill price for corn, by W. ... Camp.

AGRICULTURAL EDUCATION.

Allotment of agricultural education and research, M. CUMMING, W. ... REEK, J. A. GRENIER, W. B. ROADHOUSE, R. FLETCHER, J. McCAIG, and L. ... KLINCK (*Agr. Gaz. Canada, 5 (1918), No. 3, pp. 267-272*).—This is a serie... brief articles by Government officials, outlining the organization and contro... agricultural education and research in the various Provinces of Canada.

In Nova Scotia the heads of the various divisions of the department of a... culture are also the heads of the corresponding divisions of the college of a... culture, and the director of rural education of the department of education ... charge of the agricultural education in the schools, including school ... school gardens, etc. He frequently secures the services and always has t... cooperation of the officers of the department of agriculture.

The New Brunswick Department of Agriculture carries on all agricultura... extension or educational work, and in agreement with the department of e... cation also supervises the work of elementary agricultural education.

In the Province of Quebec matters pertaining to agriculture, even the sch... fairs, are under the direction of the department of agriculture, which rece... full cooperation from the department of public instruction and school ... spectors as regards the teaching of agriculture in the schools. Macdonald C... lege, which conducts a large number of researches and experiments, and t... agricultural schools of Ste. Anne de la Pocatière and Oka also cooperate clo... with the department of agriculture.

In Ontario all the agricultural work comes under the department of ag... culture, including the administration of the Ontario Agricultural College, ... Ontario Veterinary College, the proposed new agricultural school at K...

...ed the experimental farms in the Province. At the same time the ...ural college and the veterinary college are affiliated with the University ... also for academic purposes and the degrees for the final year are pre... by that university. Both of these colleges are presided over by presi... who are directly responsible to the minister of agriculture. The re... work is also a branch of college activities, particularly of the Ontario ...ural College, but does not come under the university authorities. ...ally all of the extension work of the department is directed from its ...ice at Toronto, with close cooperation between the officers in charge ...e professors and experimental staff of the colleges and farms. The de...ment of education has the administration of the other educational bodies ...e Province, including public schools, high schools, collegiate institutes, ...versities, and has entire control of the instruction in agriculture given ...e public and high schools. In planning the agricultural work conferences ...held between the officials of the departments of education and agriculture ...t the former may have the benefit of the special training of the latter. ...e Manitoba Department of Education is in close cooperation with the ex... department of the Manitoba Agricultural College, and matters relating ...ricultural education affecting the pupils in the schools are submitted to ...approval before being put into effect.

...Alberta research work is centered in the university, except that in the ...provincial agricultural schools, which are interposed between the uni...ty and the public schools, there is some research and experimental work ...ried on. The agricultural schools and popular and short courses are ad...tered and organized wholly by the department of agriculture. The uni...ty and department cooperate fully in all kinds of lecture and instruction ... The department of education controls the school-garden work, which is ...raged by special grants, and also cooperates with the department of agri...ure in the work of the district agents, which up to the present has been ...ely taken up with organizing home gardens and conducting school fairs. ...department of education gives special courses in agriculture to fit teachers ...their work. Its teaching of agriculture in secondary schools is limited to ...ing and directing a course in the high schools which is compulsory for ...taking a teacher's course.

...s the result of two conferences of representatives of the departments of ...ure and education of British Columbia and the University of British ...bia, held in November, 1917, it was agreed that all agricultural research, ...be conducted at Point Grey or at some other center in the Province, be ...the university authorities. All agricultural courses exceeding three ...duration in which particular emphasis is placed on the science under... the principles taught would be conducted in future by the university ...than by the department of agriculture. The department of agriculture ...conduct all illustration and demonstration field work and all work having ...object increased agricultural production, and continue to publish pop... bulletins whether prepared by department officials or by members of the ...of the university. Full cooperation between the university and the de...ents of agriculture and education is projected, including the interchange ...structors when deemed advisable. Continuation classes in agriculture ...the department of education are to be open to both young men and ...women students who have attained the age of 15 years. A tentative ...ement is to be arrived at between the departments of agriculture and ...tion whereby the minimum age limit for membership in boys' and girls' ...would be fixed at 11 years for 1918 and 12 years for 1919, and the scope ...competition in these clubs is to be extended to include special projects ...rls.

In Saskatchewan the arrangement of work as between the depart... agriculture and education and the university is practically the same ... obtaining in British Columbia.

Report of the commission on the investigation of agricultural educa... (*Boston: Wright & Potter Printing Co., 1918, pp. 61*).—This report of the ... cial commission appointed in 1916 for the purpose of investigating the ... of agricultural education as conducted at the Massachusetts Agric... College and the development of the agricultural resources of the Co... wealth, has been previously noted (E. S. R., 38, p. 301).

Duty of our State legislators to our agricultural institutions, W. H. J... (*N. Y. Dept. Agr. Bul. 92 (1917), pp. 127–134*).—An address in which the ... tion of the State to some problems of station administration is specially ... cussed.

Some documents on the history of agricultural education in Mex... (*Algunos Documentos para la Historia de la Enseñanza Agrícola en Méx... Mexico: Govt., 1912, pp. [2]+130*).—This is a detailed history of the Nat... School of Agriculture at San Jacinto, D. F., Mexico.

Rural relations of high schools, C. J. GALPIN and J. A. JAMES (*Wis... Sta. Bul. 288 (1918), pp. 44, figs. 18*).—This bulletin consists of two parts, ... ing respectively with the social and agricultural relations of high schools.

Attention is called to the increasing value of headwork on American ... through the gradual replacement of the "hoe farmer" by the "ma... farmer" and the consequent necessity of high-school education for the far... It is suggested that, inasmuch as only about one-eighth of the area of Wis... is included in high-school districts, by some form of agreement responsib... for educational ideals over the natural and legitimate rural area of influ... adjoining each high-school district be apportioned among the existing h... school boards and faculties of the county. In several Wisconsin communit... attempts have been made to take into account the mutual relations of coun... schools and high schools, and the methods employed are described in some de...

A demand for schools reflecting the daily life and interests of the agricultur... community found a response in special schools of agriculture and home ec... nomics, established in Wisconsin by individual counties within the last 15 ye... The agricultural instruction given in the Wisconsin high schools, in 25... home and school project work, boys' and girls' clubs, extension work, consoli... fairs, and live-stock judging, together with the equipment needed, is br... described. Such vocational training has been found of great practical va... in the improvement of agricultural practices and home life in the community.

Vocational training in agriculture (*Agr. Gaz. Canada, 5 (1918), No. 3, pp. 289–293*).—In this article the means adopted in the United States for the pro... motion of vocational training in agriculture are compared with the objects aimed at by the Agricultural Instruction Act in Canada, which is intended to assist in the field covered by the Smith-Lever and the Smith-Hughes Acts in this country. It is found that while there is a marked similarity of purpose between the United States and the Canadian acts, the application of funds is more restricted in the former than in the latter case. The Agricultural Instruction Act contains no limitations with reference to the application of funds to the purchase, erection, preservation, or repair of buildings or equipment, to the purchase or rental of lands, or to the support of any religious or privately owned school or college.

Lessons on pork production for elementary rural schools, E. A. Mi... (*U. S. Dept. Agr. Bul. 646 (1918), pp. 26, figs. 15*).—Attention is called to the importance and educational value of pork production, and nine lessons, includ... ing practical exercises, references to literature, and suggestive correlations, are

...on the following topics: Types and breeds, houses, swine judging, ...ing meat hogs, selecting breeding stock, dressing and curing meat, sow ... management, forage crops, and sanitation and diseases.

Lessons on corn for rural elementary schools. C. H. LANE (*U. S. Dept. Agr. ... 634 (1918), pp. 19, figs. 7*).—A revision of Farmers' Bulletin 617 (E. S. R., ... 970), including additional material on the adaptation of the lessons to ... needs of the community, the use of illustrative material, and correlating ... work with other school subjects.

Country life readers, third book. CORA W. STEWART (*Richmond, Va.: B. F. ... Publishing Co., 1917, pp. [2]+285, figs. 41*).—This is the third book of ... series of three country life readers by the founder of moonlight schools. It ... writings dealing with the forest, birds, insects, the grass family, im... farm plants, including corn, cotton, hemp, alfalfa, potato, the bean ... and the pumpkin, flowers, fruits, animals, the farmer and the farmer's ... civics, and the Scripture. The purposes of the book are to point out the ... of country life and to lead the readers to the best authors who write ... country life. The series is designed for use in evening rural schools for ... or moonlight schools.

Some mechanical aids in nature study, W. G. VINAL (*Nature-Study Rev., ... (1918), No. 2, pp. 60–73*).—The author briefly describes some general and ... aids in teaching nature study.

Home economics.—State course of study for elementary and secondary schools of Indiana, BERTHA LATTA (*Ind. State Dept. Pub. Instr. Bul. 29 (1917), ... 44*).—This bulletin contains outlines of courses of study in home economics ... (1) the seventh and eighth grades of rural schools, to give the pupils a ... view of the field of home economics rather than a detailed study of any ... (2) the seventh and eighth grades of city schools to give the pupils a gen... view of the field of home economics through a detailed study of contin... courses, and (3) the high school, including one year of work each in foods ... cookery, clothing and textiles, and home management.

Lists of individual and group equipment and references to helpful literature ... included.

MISCELLANEOUS.

Report of the John Jacob Astor Branch Experiment Station, 1914–15, ... A. LINDGREN (*Oregon Sta., Rpt. John Jacob Astor Sta., 1914–15, pp. 6, figs. ...*).—An account is given of the establishment of this substation in 1913 and ... development up to January 4, 1915.

Report of the Southern Oregon Branch Experiment Station, 1914–15, ... C. REIMER (*Oregon Sta., Rpt. South. Oreg. Sta., 1914–15, pp. 11, fig. 1*).—An ... count is given of the work in progress at this substation.

Monthly Bulletin of the Ohio Agricultural Experiment Station (*Mo. Bul. Ohio Sta., 3 (1918), Nos. 4, pp. 101–136, figs. 9; 5, pp. 139–167, figs. 14*).—These numbers contain, in addition to several articles abstracted elsewhere in this issue and miscellaneous notes, the following:

No. 4.—Work for Belmont County Experiment Farm, by C. W. Montgomery.

No. 5.—The More Common Lice of Poultry, by D. C. Mote, an extract from Bulletin 320 (E. S. R., 39, p. 85), and Potato Diseases, by D. C. Babcock, an adaptation from Bulletin 319 (E. S. R., 39, p. 53).

NOTES.

Arkansas University and Station.—H. A. Sandhouse, instructor in animal husbandry and assistant animal husbandman, has resigned to engage in war work and has been succeeded by Earl C. Thurber, of the Kansas College.

Delaware Station.—Dr. Don C. Dyer, chemist, and Dr. R. D. Mullinix, associate chemist, have resigned, the former to accept a commercial position and the latter to become associate professor of chemistry in the University of Florida. R. W. Goss, plant pathologist, has been inducted into military service and will be attached to the Medical Department.

Purdue University and Station.—Chas. Downing, for many years secretary of the State board of agriculture and a member of the board of trustees of the university, died July 27. G. A. Branaman has been appointed assistant in animal husbandry.

Nebraska University.—Dr. Samuel Avery, who has been on leave of absence as chancellor for several months in war service, has been commissioned major in the Chemical Warfare Service of the Army and has been placed in charge of the section on university relations.

Cornell University.—Dean Albert R. Mann has succeeded President J. G. Schurman as a member of the State food commission. Daniel P. Witter, who has been actively identified with farmers' institutes in the State for about 20 years, has been appointed to the staff of the extension department as adviser in institute extension. John H. Voorhees has been appointed to the extension staff in the department of field crops.

North Carolina Station.—According to a note in *Science*, Dr. R. O. Cromwell, assistant plant pathologist, has been appointed extension plant pathologist at the Iowa College.

Ohio State University.—Benjamin L. Thompson, associate professor of animal husbandry at the South Dakota College, has been appointed specialist of animal husbandry in the agricultural extension service.

Oklahoma College and Station.—The resignations on August 1 are noted of J. S. Malone as head of the department of animal husbandry, Dr. E. A. Beebrook as assistant veterinarian, and Dr. L. Chas. Raiford as professor of chemistry, the two last named having accepted positions at the Iowa College. Dr. John E. Guberlet on July 1 succeeded C. C. Knoblock, resigned as assistant parasitologist. W. E. White has been appointed assistant professor of horticulture, vice Miss Anna Cohen. Carl P. Thompson, of the Kansas College, has been appointed assistant in animal husbandry, beginning August 1, in charge of dairy cattle and hogs.

Pennsylvania Institute of Animal Nutrition.—Owing to the depletion of the institute staff by the demands of the war and the difficulty of securing a sufficient number of competent assistants with the funds available, it is anticipated that the investigations with the respiration calorimeter which have been in progress since 1902, with the cooperation of the U. S. Department of Agriculture, will have to be discontinued for the present. The investigations since 1915 have been upon the metabolism of dairy cows, with the cooperation of the Dairy Division of the Department, and it is hoped that it may be possible to continue such phases of the work as do not require the use of the calorimeter.